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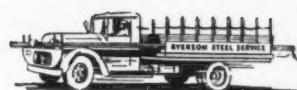
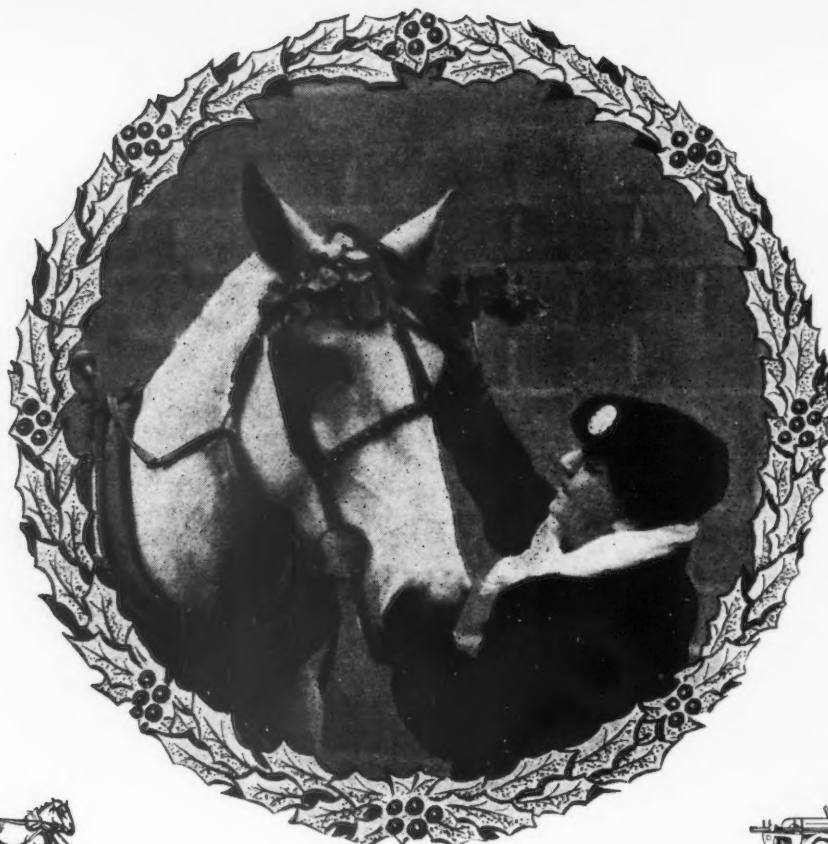
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The Scene Has Changed— But the Spirit Remains

This Christmas and the coming of the New Year brings us through our 104th year in the steel-service business. The plodding horses that carried our steel to an earlier generation of American manufacturers have passed from the scene. In their place, powerful trucks streak over the highways at speeds that would have seemed incredible not so long ago.

Similarly, the twelve Ryerson plants of today bear little resemblance to the tiny iron store where our business began in 1842. Carbon, alloy and stainless steels replace saddle tree, horse shoe, boiler and sheet iron in our stocks—and our methods have also changed to match the strides of industry through the past century.

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Unchanged, too, is the meaning of Christmas. Today, as we move outward from the aftermath of history's greatest war, its symbol in words is more heartening than ever: Peace on earth and good will toward men.

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Day of Portents

WEDNESDAY, Dec. 4, 1946, was a fateful day for the United States. It was the beginning of a new era, the culmination of two events shaping the destinies of both the United States and the World.

One event was primarily domestic, the other international; the one in Washington was stark in the concentrated glare of unprecedented publicity, the other at Lake Success, N. Y., labored for the attention of an indifferent public.

The sudden, uncompromising punishment of John L. Lewis unleashed great behind-the-scenes pressures which resulted in his capitulation. This marked the end of a 14-yr period of labor-union aggrandizement. The temper of the people and the very unanimity of anger were such as seldom has been seen in this country. They are the pressures that will alter existing Federal laws to better protect the economy from shattering work stoppages.

However, anger can be a blinding emotion. The wrongdoings of unions have been many and tempers have progressively frayed to raw edges. If Congressional action were to be cast along punitive rather than corrective lines, unions may perceive no option other than common battle for survival. And while battle for principles is emotionally stimulating, the ebb and flow of management-union enmity and constant eruptive spasms in industry could well make 1947 as discouraging as 1946.

The drama that unfolded in Judge Goldsborough's court room was matched that afternoon in the dark-panelled United Nations assembly hall at Lake Success. Molotov announced acceptance of international inspection of armaments and (by implication) atomic weapons—not the usual acceptance in principle, but full acceptance without the force of veto protection. While it is still not down in writing and while U.S.S.R. policy frequently twists and turns, the way does appear to be open for adoption of the Baruch proposals. Their adoption opens to the world a strange, new, hopeful avenue into the future. Travel down this avenue of overriding sovereignty of international inspection will be halting and cautious, but at the end there is the promise of relief from the terrible economic burden of an armaments race and the human fear of atomic destruction.

Thus, the day at Lake Success has promise of capturing the space in history books, even though the day in Washington garnered all the newspaper headlines.

T. W. Lippett



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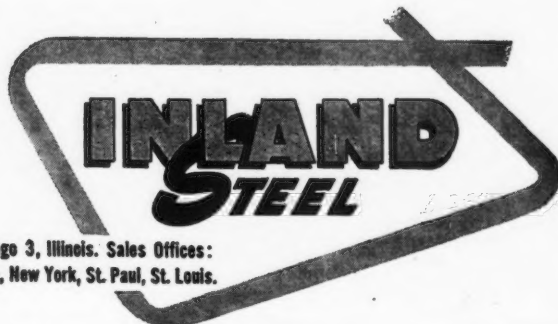
facilities are Inland's experienced engineers and metallurgists applying their skills to every phase of development, production, and control...making certain that every ton of steel produced is worthy of the name...INLAND!

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► The director of the Polish Geological Institute, Professor Bohdanowicz, is reported to have claimed that his country possesses the richest uranium deposits in Europe. According to the professor, the Germans had begun to exploit the deposits when changing tides of war stopped them and the mines were damaged. The Poles are repairing them but mining has not yet started.

► When the Eightieth Congress convenes next year one resolution almost certain to be introduced is one to declare the war at an end. But even if it becomes law some of the war powers will not terminate for 6 months after its passage.

► A German scientist working with the Air Materiel Command at Wright Field discloses that the Germans developed a sintered ruby material which he asserts will give results closely approaching diamonds when used for dressing grinding wheels.

It can be extruded or pressed in a variety of shapes. For it he reports a hardness 5 to 10 pct higher than aluminum oxide or corundum and claims for it some properties which are superior to the carbides.

► Another possible use for iron pyrites, "fool's gold," in its nonmagnetic state is as an abrasion resistant filler in rubber articles. Despite its somewhat higher cost as a filler, tests indicate that its high abrasion resistance may make it practical in such products as floor mats, gravel slingers and belting.

► Assistant Secretary of the Interior C. Girard Davidson, has stated that United States reserves of raw materials in terms of years are as follows: Chromite, 1; platinum, 2; tungsten, 4; antimony, 4; vanadium, 7; bauxite, 9; lead, 12; cadmium, 16; zinc, 19; copper, 34; fluorspar, 40; sulphur, 55; iron ore, 111; potash, 117; anthracite, 195; other materials from 100 years to an indefinite period of time.

► Of the 468,000 individuals holding the common and preferred stock of American steel companies, 232,500 are women, according to an American Iron & Steel Institute survey of companies operating 91 pct of the nation's steel capacity.

► High speed automatic electrical control of the braking system of the Illinois Central's "City of New Orleans" is an interesting development in push-button rail-roading. The engineer pushes a button when he wishes to stop and a robot electrical aid automatically applies the brakes with selective pressure during the entire stop. A device called a Decelostat is reported to eliminate wheel slide by releasing the brakes on any wheels which begin to slide and retightening them again to reach the proper ratio to the other brakes.

► British sources estimate world requirements for bicycles at 50 million units. The English made 1,360,000 cycles in the first 10 months of this year, exporting 60 pct of them.

► Many steel exporters have taken sharp cuts on their applications for export licenses for the first quarter of 1947. In the case of merchant bars, which were virtually wide open in the fourth quarter of 1946, first quarter 1947 export licenses on them have been cut almost to the bone.

► A new welding technique called contact arcwelding is said to permit welding by unskilled workers because the end of the electrode is held in direct contact with the work at all times and is merely drawn along the surface. It uses special electrodes in which more than 50 pct of the weld metal is contained in the coating.

► Vacuum melting using high frequency induction heating of melts as large as 10,000 lb has been employed in Germany to produce high quality alloys with unique properties particularly adaptable to high temperature service.

► Vanadium Alloys Steel Co. has developed a new tool steel which takes advantage of the effect of high carbon to increase wear resistance and develop extremely high hardness from heat treatment. Brittleness from the high carbon content is avoided by the addition of 5 pct V, which also increases the hot hardness of the steel.

► A new 12-speed lathe developed by Le Blond features a direct belt drive for the higher speeds up to 1800 rpm, and a gear drive for the lower speeds down to 28 rpm.

► Volume production of transparent mirrors has begun at Libby-Owens-Ford Glass Co., taking the wraps off a secret wartime development. The new product functions as a reflecting surface when seen from one side and as a window when viewed from the other. Key to its performance is the thin film of chromium alloy with which it is mirrored. The film, four ten-millionths of an in. thick, is applied by molecular bombardment of the glass with chrome particles.

► The Federal Trade Commission is reportedly undertaking a new investigation of the steel industry, a study on "lagging production." Subsequent studies are due on the copper, lead and automotive industries.

► To get a new car in Belgium there's no question of beating a dealer out of one. In Brussels, for instance, the chamber of commerce processes requests and grants priorities to buyers on a basis of personal need and national interest.

ELECTRODE holder specially designed for contact arcwelding. Starting is effected by pressing the thumb button, which closes the circuit.



CONTACT

Arcwelding

By P. C. VAN DER WILLIGEN
N. V. Philips' Gloeilampenfabrieken
Eindhoven, Holland

Recently developed in Holland, a new welding technique called contact arcwelding, is explained herein. Employing special electrodes in which more than 50 pct of the weld metal is contained in the coating, the author claims the process may be used by entirely unskilled workers since the end of the electrode is held in contact with the work at all times and merely drawn along the surface. In addition to describing this process, the author also contrasts various phases of current European welding practice with American methods.

THE method of electric arcwelding widely used today, where the deposited material comes from an electrode held close to the workpiece, was first introduced by Slavianoff in 1892. In those days direct current was used exclusively, since, with alternating current of a safe voltage, the arc between the iron electrode and the workpiece was always being extinguished. Only after 1908, after Kjellberg had introduced a coating of slag-forming substances around the rod, was it possible to use ac for welding. The coating emits so many electrons, that the welding arc, which with ac of 50 cycles is extinguished 100 times per sec, continues to burn; or, more accurately, it is reignited 100 times per sec.

As far as welding with ac and the mechanical properties are concerned, the introduction of a coating for the electrode has meant a great advance. Arcwelding, however, has always remained an art, which can be mastered only by much practice. The introduction of the coating has indeed made it easier to do overhead welding. The cup formed during the welding serves to direct the molten drops of metal, just as the barrel of a gun directs the projectile. As to welding in the down-hand position, however, the coating has scarcely made it any easier. While on the one hand the welder has the convenience of being able to check the speed of travel by following the slag behind the arc, on the other hand the coating and the slag hide the melting down process and the melting pool from his view.

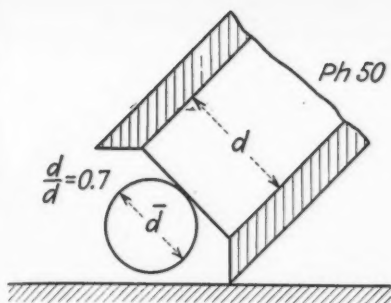
The great difficulty in free arcwelding has always been in maintaining the arc. The welder must con-

tinually take care that the distance between electrode and workpiece is only a few millimeters and that it remains constant. When the distance is too small the rod freezes to the workpiece. When the distance is too large, the arc burns irregularly and the quality of the work suffers, and with ac there is much chance of the arc being extinguished.

In the course of years, however, it has been noticed that with certain types of electrodes the coating can rest on the workpiece during the welding; this is called touch welding. It was found that this procedure was only possible with heavily coated electrodes. This can be understood, when it is considered that in welding with a rod with a thinner coating, only a short cup is usually formed around the arc. When the edge of such a cup is allowed to rest on the workpiece, the drops of metal flowing from the core wire short circuit and freeze the rod to the workpiece.

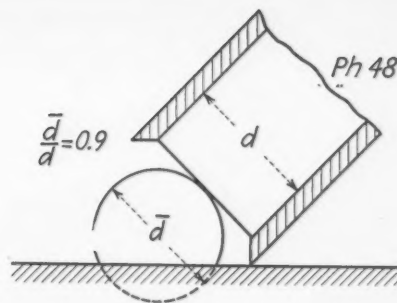
In trying to determine the relation between the thickness of the core wire and that of the coating necessary to prevent this action, it is found that it depends upon various factors. Assuming that the welding is done at an angle of 45° to the axis of the electrode, it will be seen from fig. 1 that the relation between the size of drop of the molten metal and the dimensions of the cup is such, for instance with the electrode of the Philips type Ph 50, that touch welding is just possible, while with type Ph 48, see fig. 2, it will be quite impossible.

From this the conclusion might be drawn that to make touch welding possible it would be sufficient to



LEFT
FIG. 1—Sketch showing that with conventional electrodes, the relationship between the size of drop of the molten metal and the dimensions of the cup is such that touch-welding is just possible.

RIGHT
FIG. 2—With this type of electrode touch-welding will be quite impossible.



give the electrodes a heavy coating. Not only would this, however, be an expensive method, but at the same time difficulties would occur in the welding because of the larger amount of slag.

It is to be pointed out that figs. 1 and 2 are only rough sketches; for instance, the formation of the crater, a small dimple in the workpiece underneath the arc, has been disregarded. When high currents are used this crater is rather deep and in that case touch-welding with electrodes of type Ph 50 and 55 easily succeeds. It has never been possible to arrive at a general application of touch-welding because of the limitations just mentioned and some others.

For all these reasons, research work was carried out in this laboratory with the object of perfecting the properties necessary for touch-welding to such a point that welding could be done with much less trouble and that practically no errors could be made in welding. This includes the requirement that the weld bead should have a flat and uniform appearance. This investigation has now led to a new method of welding for which the name "contact arcwelding" was chosen, for the reasons which will be explained. Although, in principle, other types of electrodes could have been used in this development, the Ph 55 was chosen as a starting point because its mechanical properties surpass those of other types of electrodes (i.e. because it has a low oxygen and nitrogen content). Ductility and impact value are very high. By using the Ph 55, therefore the chance of cracks in the weld is small, which is especially important in welding hard steels and also dynamically heavily loaded structures. For welding hard steels and steel containing much sulfur it is, moreover, important that the electrode Ph 55 is insensitive within wide limits to the content of carbon and sulfur of the workpiece.

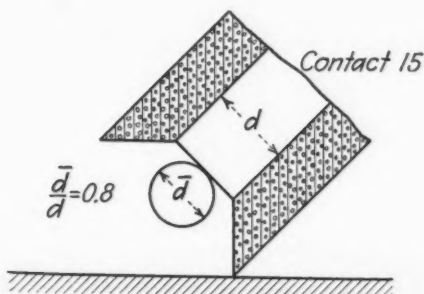
The fact that, in spite of all these good properties, the electrode Ph 55 is not universally employed is due to the fact that much care is required to make good welds with this type of electrode. If, for instance, the welder uses too long an arc, porosity may result in the weld. If a welding transformer is used

with a low open voltage (< 60 V) difficulty is experienced from the extinguishing of the arc. The welding is thereby interrupted and has to be started again, which leads to inhomogeneities in the weld.

Therefore, the electrode Ph 55 had to be altered in such a way as to overcome these objections, while still retaining the important advantages mentioned. The first step in this direction was to try to perfect the quality necessary for good touching, without increasing the quantity of slag-forming coating material. This was achieved by applying the principle of making the coating heavier, (which principle, of course, is by no means confined to the use of the Ph 55 rod) by transferring part of the metal of the core in a finely divided form to the coating. The ratio of metal to slag in the welding rod may remain the same. A limit is set to the transfer of metal from the core to the coating of the rod by the consideration that the core, which has to carry the current, may not be too thin, as otherwise the resistance becomes too high and the permissible arc current too low.

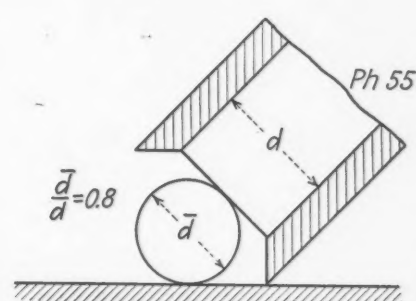
In the case of the newly developed electrodes, which are denoted by the word contact (thus for example: Contact 15), since they are in continuous contact with the workpiece, about half of the metal of the core is transferred in scattered form to the coating. In fig. 3 it is indicated diagrammatically that, with electrode Contact 15, touch-welding should be quite easy. The external diameter of the electrode is more than twice as great as the diameter of the core, so that the coating is extremely heavy. For the sake of comparison an ordinary electrode Ph 55, which has the same external diameter and the same weight, is shown in fig. 4. These two electrodes deposit the same amount of iron in the same time.

Different kinds of electrodes are distinguished not only according to their type, but also according to the thickness of their core, which follows the name of the type. This thickness determines the arc current and in the case of ordinary electrodes also the amount of metal deposited per second. It must be borne in mind that, in the case of the new contact



LEFT
FIG. 3—With the newly developed contact electrode touch-welding should be quite easy. The OD is more than twice the diameter of the core, so that a large cup is formed.

RIGHT
FIG. 4—This electrode will deposit the same amount of metal as that shown in fig. 3, and has the same OD and weight but a normal coating thickness.



electrode, only half the molten metal comes from the core, the other half being supplied by the coating. In the case of the electrode Contact 15, therefore, the diameter of the core is $\sqrt{2}$ times smaller than that of an electrode Ph 55 depositing the same amount of metal. The new electrode Contact 15-5, therefore, corresponds to the ordinary electrode Ph 55-7.

With the electrode Contact 15 the ignition of the arc has also become much easier. It is not done in the usual way by tapping and breaking off the cup, but entirely automatically. This simplification in starting is closely connected with the new composition of the coating.

In the development of the contact electrodes much metal has been transferred from the core to the coating. When the amount of metal transferred to the coating is approximately the same as that remaining in the core, the conductivity of the coating is found to have become so high that when the coating, under tension, is brushed over the workpiece sparking occurs, such as takes place from the trolleys or shoes in electrical traction when there is icing. A current is then flowing of the order of magnitude of 0.1 amp. When the coating is not brushed over the edge, but is held against a definite spot on the workpiece, the current will rise rapidly and at a value of about

electrodes then ensures that the arc is immediately reignited. As a result with electrodes of the type Contact 15, which have a core diameter of less than 5 mm, it is possible even to touch-weld with open voltages of the welding transformer lower than for the corresponding electrodes Ph 55, i.e. they need not be so far above the arc voltages. The contact electrodes 15-3.25 and 15-4, which have core diameters respectively of 3.25 and 4 mm, have for example an arc voltage of 25-30 v, and it has actually been found that touch-welding can be done very successfully with them at an open voltage of 60 v. In some cases, it is found possible to work successfully at lower open voltages, 50 v, at which, if the corresponding normal electrodes were used, there would naturally be trouble from extinction. For the new

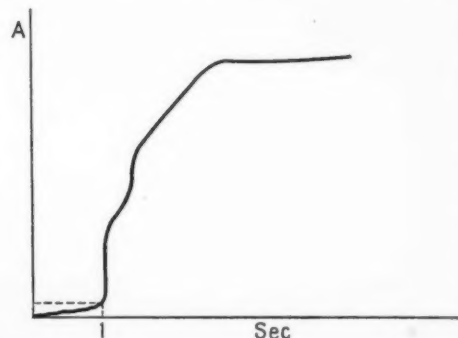


FIG. 5—Oscillogram of the current trend when the arc of a contact electrode is being ignited. The arc is struck at approximately 1 amp and 1 sec.

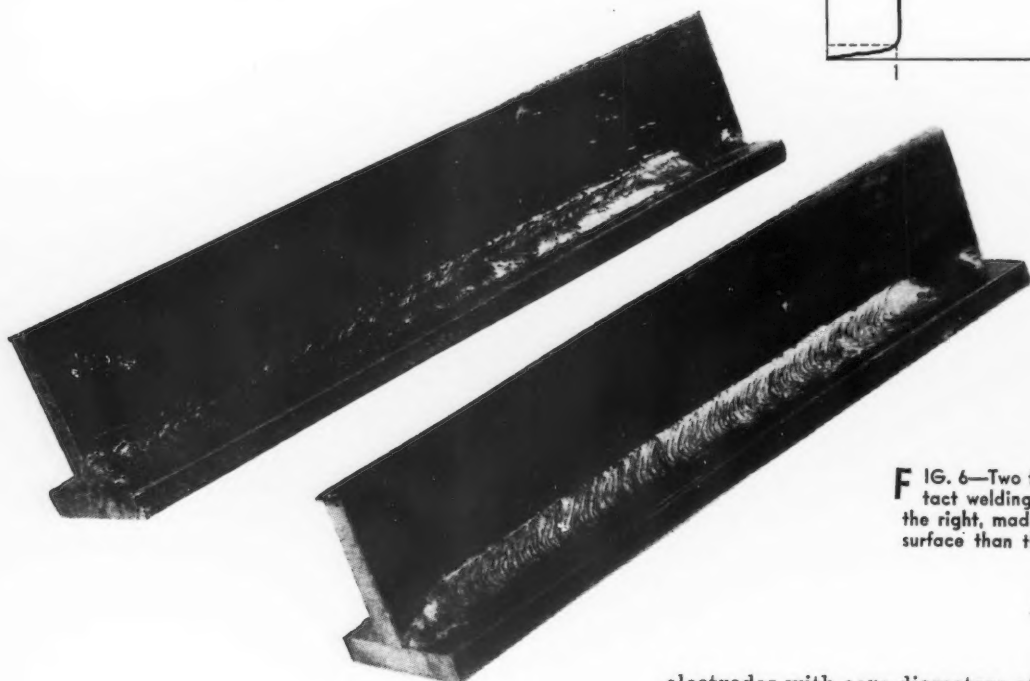


FIG. 6—Two fillet welds made with contact welding in a flat plane. That on the right, made with dc, has a smoother surface than the one on the left, made with ac.

1 A will suddenly pass to an arc—the welding arc is then automatically ignited. The oscillogram of the current flowing with Contact 15 is illustrated in fig. 5; the arc is usually ignited within 1 sec. When in the hot condition, ignition takes place even more quickly, and obviously the voltage applied also has some influence on the speed of ignition.

Thus the electrode Contact 15 has been made self-starting. Not only has it become unnecessary for the welder to start by tapping, but the reignition, after an interruption of a few cycles, also takes place automatically. Such an interruption may take place accidentally and result in the extinction of the arc, when a welding transformer is used with a low open voltage. The conductivity of the coating of the new

electrodes with core diameters of at least 5 mm (thus corresponding to normal electrodes of at least 7 mm core diameter), however, higher voltages are necessary.

The new electrode Contact 15-5, for instance, has an arc voltage of 40 v. If a welding transformer is used with an open voltage, which lies only slightly above this, the transformer works too much in the flat part of its characteristic, which means, that only small variations in the voltage will result in large current fluctuations.

The best results are obtained when the open voltage of the welding transformer lies about 30 v higher than the arc voltages, thus, for the electrodes Contact 15-5, this will be 70 v. Welding then takes place in the steep part of the characteristic, i.e. in the part where the voltage depends closely on the current, so

that any variation in the arc voltage scarcely affects the current.

The advantage of contact arc-welding therefore lies in the possibility of easy touch-welding and the automatic ignition and reignition of the arc. Moreover, with a given current the amount of metal deposited per unit of time is considerably greater.

It has been found that these new contact electrodes are not only suitable for contact arc-welding, for which purpose they were developed, but that they also offer important advantages for welding with the free arc. The contact electrode gives much less extinguishing of the arc, even when the open voltage of the welding transformer is lower than normal. This is probably the result of the great conductivity of the coating, which now and then touches the pool when the cup is so long.

It is remarkable how easy it is to weld with the contact electrodes. This is due not only to the ease of touch-welding, but also to the self-starting. If one must start at a precisely fixed point it is a great convenience if the starting is automatic, especially when using holders with a push-button mechanism. The welder places his electrode tip on the predetermined spot, puts the shield before his eyes and presses the button. It is a great convenience for beginners, too, that there is no longer the trouble of tapping and striking the arc.

As has already been stated, practice is necessary in order to maintain the proper distance between core and workpiece when welding with the free arc, and it is found that this even presents difficulties for experienced welders when welding has to be done in difficult positions, so that they too may then have trouble with freezing. With the newly developed electrodes, however, the coating has been made so thick that the cup of the rod is always deep and strong enough to keep the core in touch-welding at such a distance from the workpiece that it cannot freeze.

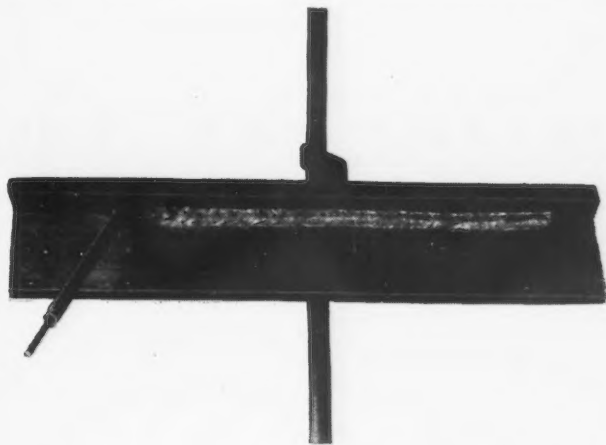
The mechanical properties of the material deposited by these new electrodes Contact 15 and Contact 18, are found to be similar to those of the corresponding normal electrodes Ph 55 and Ph 48. The fact that in the case of the contact rods the arc is for the greater part surrounded by the deep cup, is a favorable factor, diminishing the absorption of oxygen and nitrogen from the air.

While it is usual to weld from left to right, welding from right to left also often occurs in practice, and left-handed welders were desired for such work. With contact electrodes this work, which is no more difficult than melting a candle at a uniform rate against a hot plate, can also be done by right-handed welders, namely with the back of the hand turned toward the workpiece, called backhand welding, or



by holding the holder in the left hand, which, in the case of the more difficult normal welding, can only be done successfully by left-handed welders.

Just as with normal electrodes, care must also be taken with contact rods to prevent the slag running ahead of the arc. To accomplish this in contact arc-welding, the angle between electrode and workpiece must not be too large. In the down-hand position an angle of 40 to 45° is best. If a smaller angle is chosen there is more sputter. Another disadvantage of a



ABOVE

FIG. 7—With contact electrodes, overhead welding, as shown here, is greatly simplified.

LEFT

FIG. 8—Vertically-up weld made with a contact electrode. Since weaving has to be done in this case the contact feature offers no advantage, and a free arc is employed.

very small angle is that the arc does not dig so well into the root of the weld, which is often of importance, when using these rods with deep cups. In practice, it sometimes happens that it is impossible to maintain the desired angle of 40 to 45°; for instance because of the proximity of a transverse partition. It is then possible to weld from right to left or to use the free arc. One can then weld in such a way that the slag remains behind the arc although the rod makes a large angle with the workpiece.

The most convenient position for making a welded joint is the flat position where the surface of the bead is in the horizontal plane, fig. 6. In this position the heaviest electrodes can be used without difficulty. This is true not only for the methods of welding so far commonly applied, but also for contact arc-welding, with which very fine results can be obtained. Fig. 6 shows two fillet welds made with Contact 15-5, on the left with 360 amp ac on the right with 310 amp dc.

For fillet welds made in the horizontal position where one plate is horizontal and the other perpendicular to it, Contacts 15-3.25 and 15-4 can be used. With heavier electrodes the weld is strongly convex in form.

A most remarkable achievement is the ease with which overhead welding can be done with Contacts 15-3.25 and 15-4. This is the most difficult position for welding and, as far as is known, it was never possible to apply touch-welding with success in this position. Overhead contact arc-welding, however, is found to be very easy. Fig. 7 is a photograph of a



FIG. 9—Vertically-down welding, as shown here, can be successfully performed with the contact electrodes.

weld made in this position with Contact 15-3.25 and using 140 amp dc. In overhead welding experienced welders sometimes prefer to use the free arc, for instance in order to make the weld somewhat wider by means of a weaving motion. Also in this respect Contact 15 offers advantages over the normal coated electrodes, the most important of which results from the deep cup of Contact 15, which gives better direction to the drops; consequently very little material falls to the ground. When, however, Contact 15-5 and larger sizes are used, the pool becomes too large and the molten iron falls out of it, so that Contact 15-4 is the heaviest electrode that can be used for overhead welding.

In work on ships it is often necessary to make a horizontal weld in the vertical plane (the ship's side). This work can be done very well with contacts 15-3.25 and 15-4. In vertical-up positions the electrode should, in general, be moved sideways, weaving, perpendicular to the direction of the weld, in order to obtain a sufficiently wide bead, the fused material being left to solidify at the desired spot; thus the great advantage of contact arcwelding, namely that no precisely regulated motions need be made, does not apply in this case. In vertical-up welding, therefore, the free arc will always be used, but the electrodes already men-

tioned can be used here to advantage. Fig. 8 shows a good vertically-up weld made with the free arc using Contact 15-3.25 and a welding transformer with an open voltage of only 50 v. In vertical-down welding Contact 15 generally gives rise to an excessive amount of slag. The welder must try to keep the slag above the

welding arc, because if it is allowed to run down, it pushes the arc and the molten metal aside, resulting in faults in the surface of the weld. For these reasons a contact electrode has been developed with a thinner coating, namely Contact 18. Taking as basis Ph 48, which is very much used for vertical-down welding, the same principle has been applied here as in Contact 15. Thanks to the small amount of rapidly solidifying slag, it is easy with Contact 18 to keep the slag above the welding arc. Welds made in this manner have a particularly good appearance. Since the surface of the bead is very smooth, the slag often loosens of itself. This contact electrode, like Contact 15, is suitable not only for dc but also for ac. The weld of fig. 9 was made with the help of Contact 18.4.

In conclusion, a few remarks are in order about welding with high currents, where heavy welding rods are used, and which in the U. S. is called hot welding. The currents used are higher than 600 amp and the diameters of the electrodes greater than about 7 mm. As yet, however, this method has not met with much success, for the following reasons:

- (a) Handling heavy electrodes becomes fatiguing for the welder.
- (b) There is much spatter with these rods.
- (c) Heat radiation becomes troublesome, especially in hot weather.
- (d) Difficulty is very often experienced from undercut, the plate material being burnt away along the toe of the weld.

If Contact 15-6, 15-8 or 15-10 is used for this purpose (the last corresponds to Ph 55-14 and is used with 900 to 1200 amp), the first difficulty is overcome, since in contact arcwelding the electrode rests on the workpiece. Due to the deep cup shielding the arc, also spatter is considerably reduced; tests showed spatter losses only 1/3 of those obtained with the

The rods described in this article are not yet available in the U. S., but further details of the development may be obtained from North American Philips Co., New York.—Ed.

corresponding electrode Ph 55. For the same reason heat radiation from the arc is lowered, especially in the direction of the weld, since in that direction the cup almost completely shields the arc. Finally, with Contact 15, undercut is eliminated as a result of the special form of the penetration.

Stretch-Reducing Seamless Tubing

USE of tension in the final sizing operation has made possible the commercial production of small diameter hot-rolled seamless pipe. The various aspects of this operation were described by S. Findlater, assistant to the president, National Tube Co., Pittsburgh, in a paper entitled "Use of Tension in Sizing Small Diameter Seamless Pipes and Tubing," presented at the annual convention of the Assn. of Iron and Steel Engineers held recently in Cleveland.

Application of this principle not only permits substantial reductions in wall thickness of the tube to be made in the sizing mill, but also provides a means for making exceptionally large reductions in the diameter of the tube with a relatively small number of roll stands. The operation involves the introduction of tension in the tube section by increasing relative

speeds of the rolls in successive stands to a greater degree than is required to compensate for the change in section area produced by the reduction in the several roll passes. The added speed differential between the rolls in successive roll stands produces tension in that portion of the tube which is between these stands. The magnitude of this tension which acts in the direction of the tube axis is sufficient to elongate the tube between successive stands, resulting in a reduction in section area.

With the application of sufficient tension, the reductions in wall developed between stands can be made to exceed the amount of thickening produced by the compressive forces in the roll pass, thus permitting the production of finished tubes of lighter wall than the entering shell.

New Tool Steel Features

Improved Hot Hardness

RECOGNIZING the effect of high carbon in increasing wear resistance and developing extremely high hardness from heat treatment, Vanadium Alloys Steel Co., Latrobe, Pa., has developed a new type of high-speed steel called Vasco Supreme. Brittleness (from the 1.50 pct C present) is avoided by the addition of 5 pct V, which also increases the hot hardness of the steel. The hot hardness qualities are further improved with proper cobalt content.

Vasco Supreme has been under test for some time on single point lathe and screw machine tools, flat and circular form cutters, broaches, drills and solid and inserted blade milling cutters. Performance records obtained on a variety of steels and hard cast iron indicate that savings in machining time can be accomplished and increased life between grinds expected, on those materials normally considered difficult to machine. Vasco Supreme appears capable of operating at speeds 15 to 100 pct higher than the 18-4-1 and 6-6-2 high-speed steels. It has all the fabricating possibilities of any other steel and can be used with similar cutting angles. Its wear resistance surpasses that of cast alloys and if the cutting speed and feed is regulated so that heat of service does not become excessive (as to cause softening of the cutting edge) it will give superior performance.

Since greater heat is generated when machining high tensile materials, such as heat-treated steel, speed increases cannot be as great as when machining low tensile material. However, test results indicate the possibility of obtaining increases in speed, especially on such materials as SAE 52100, NE 8749, etc., particularly when these steels are machined in the annealed state. Vasco Supreme is performing with satisfaction in machining hard cast iron and cast steels where abrasion resistance, due to surface condition of the parts, has previously caused rapid tool wear.

A precaution to be observed in the grinding of this newly developed steel is that it is a steel of exceptionally high wear resistance and therefore cannot be ground as rapidly as the usual types of high-speed steel. The proof of its high degree of wear resistance lies in its resistance to grinding or any other form of abrasion. It is necessary that the grinding wheels be

cleanly dressed, light feeds must be used and water or coolants must not be used unless the tool is thoroughly flooded with the same.

This steel forges satisfactorily within the range of 2100° to 1700°F. It should be slowly heated to the initial forging temperature of about 2100°F and it is preferable that a preheating temperature of about 1400°F be employed. The steel should be soaked at the forging temperature and the initial working should be with light blows or pressure until the steel begins to flow readily. Reheating can be accomplished as often as necessary to maintain the temperature within the above range. Care should be taken to avoid forging too cold. When forging is completed, the steel should be cooled to at least 400°F by burying in silocel, lime, mica or similar insulating material before reheating for annealing.

With regard to the annealing practice, pack annealing is recommended following forging since this method will insure the lowest hardness results. Cast iron chips or dry sand to which has been added a small amount of powdered charcoal is recommended as a packing compound. Slow cooling in the furnace at a rate of about 50°F per hr to 1000°F will produce a hardness of 241 Brinell or less. Below 1000°F the steel may be cooled more rapidly.

To obtain maximum hardness of Vasco Supreme, it is recommended that the steel be preheated to 1450° to 1550°F followed by transfer to a high temperature furnace at 2250° to 2300°F, depending upon the type of furnace used, the type of tool and its size. Tool bits and similar single edge tools used for heavy duty cutting should be heated to 2200°F if a controlled atmosphere furnace is used, 2280°F in a semi-muffle type furnace and 2260°F in a salt bath. Preheating should be for a sufficient time to insure release of machining or other cold working stresses.

Quenching may be done either in air or oil. The tempered hardness in tools cooled in still air will be about one Rockwell point less than for tools quenched in oil from the same temperature. Oil quenching is recommended since scale formation is held to a minimum, in addition to the slightly higher hardness to be expected.

The effect of tempering is such that a secondary hardness considerably greater than the as-quenched hardness can be expected when tempering is accomplished at 1000° to 1040°F. In the event that maximum hardness is not obtained from double tempering, a third tempering may produce increased hardness if the austenitic condition developed from quenching has not been fully transformed.

The hot hardness of Vasco Supreme, compared with other high-speed steels, is shown in table I. Prior to testing, the Vasco Supreme specimens were hardened in oil from 2260°F and tempered at 1000°F to a hardness of Rc 67 measured at room temperature.

TABLE I
Results of Tests At Elevated Temperatures

Testing Temp., ° F	BRINELL HARDNESS			
	Vasco Supreme	18-4-1	18-4-2 + 8 pct Co	8 pct Mo + 1½ pct W
1000	677	510	575	475
1100	576	480	520	475
1200	462	337	400	308

By GEORGE T. MOTOCK
Cleveland

... Vacuum Melting

VACUUM melting, a process for the production of a pure, dense product substantially free from oxides, occluded gases and dissolved nitrogen and hydrogen, has thus far been applied only to the making of high quality metals and alloys. By melting in vacue, at pressures below one atmosphere, or low pressure artificial atmospheres, such as natural gas or hydrogen, carbon-free chromium alloys may be obtained. Application and development of vacuum melting are worthy of consideration because alloys made by this process have certain properties which cannot be duplicated by any other means.

The development of the vacuum melting process is closely related with the growth of Heraeus Vacuumschmelze of Hanau, Germany. Although the theoretical aspects of vacuum melting are old, it was W. Rohn who first succeeded in bringing vacuum melting to significant technical use. Rohn established Heraeus Vacuumschmelze in 1921 and started to build full-sized production vacuum melting furnaces in 1923. In 1936 Heraeus Vacuumschmelze was absorbed by Siemens-Halske of Berlin. Production of nickel-chromium alloys by vacuum melting was begun in 1927 with a melt of 5 lb but by 1938 the largest size melt was 10,000 lb. At first heat was supplied to the vacuum melting furnace by electrical resistance; later low frequency induction was used, and since 1931 high frequency induction heating has been employed.

An idea of the furnace development can be obtained from the following table showing the furnace capacities available in the respective years, all furnaces having been built by Heraeus Vacuumschmelze.

Year	Capacity Of Largest Furnace In Lb	Type of Furnace
1917.....	1.1	Electrical resistance
1919.....	6.6	Electrical resistance
1920.....	11.0	Electrical resistance
1922.....	52.9	Electrical resistance
1923.....	88.2	Electrical resistance
1924.....	661.5	Electrical resistance
1925.....	661.5	Low frequency induction
1926.....	1,102.5	Low frequency induction
1928.....	8,820.0	Low frequency induction
1931.....	44.1	High frequency induction
1934.....	1,102.5	High frequency induction
1936.....	4,410.0	High frequency induction
1938.....	11,025.0	High frequency induction

Heraeus Vacuumschmelze made and rolled steels for high temperature service, stainless steels, beryllium alloys and master alloys. Most of the alloys produced at Hanau were melted and poured inside a vacuum induction electric furnace. Open induction electric furnaces (Siemens-Halske design) were used for melting alloys which were not required to be of superior quality. The vacuum melting furnaces were

pumped for 6 to 8 hr to 7 mm Hg inside pressure. The metal was melted and poured at this pressure and $\frac{1}{2}$ hr after pouring, the vacuum was released. Melting in vacuum prevents loss of beryllium, secures hardenable alloys with reproducible properties and eliminates gases as well as carbon, sulfur and phosphorus.

The melting time for a furnace of 1323-lb capacity was $2\frac{1}{2}$ hr and for a furnace of 1764-lb capacity was 3 hr. Four men were needed for the operation of two 772-lb furnaces and the same number was required for the operation of one 2205-lb furnace.

Of the types of vacuum furnaces developed by Rohn two were most commonly used:

(1) The ring type which was an inductively heated vacuum furnace with one or two attached molds at a well defined angle so that the charge was not only melted but was also poured under vacuum and entered the mold directly. The fundamental design of such a furnace is shown in figs. 1 and 2.

(2) In vertical crucible vacuum melting and pouring, fig. 3, the crucible in which the metal was melted was provided at the bottom with a discharge opening or tap hole plugged with metal. When the metal charge was ready to be cast, the tap hole plug was melted by an induction coil. The metal charge was then cast into a water-cooled copper mold.

Furnaces of 1323-lb capacity were of the ring type. The 4-ton furnaces were the vertical type. Low and high frequency currents were used depending on the type of furnace.

The 4-ton furnace crucible lining was prepared according to Rohn's method. By this method the bottom was tamped inside the copper coil, a rectangular tube of 0.15 in. thickness and 1.2x3.5 in. cross-section, lined with an asbestos jacket and a metal sheet properly placed. A layer of sintered magnesite mixture was then tamped in. This mixture consisted of:

88 parts electrically fused magnesia with a grain size of 0 to 0.078 in.

10 parts electrically fused magnesite

2 parts powdered glass or ground openhearth slag.

This 6-in. thick lining was capable of withstanding temperatures of more than 3450°F even under the most pronounced stresses.

For the sintering template 0.4 in. sheet could be used. Sintering took place through the template which was slowly heated by induction until it finally became hot enough to melt. The copper tube coil was cooled with circulating water. Fine white sand filled to the wooden outside frame protected the exterior of the coil. The housing over the crucible was made of aluminum with welded aluminum cooling pipes on the outside to cool the housing with water. In small

ing in Germany . . .

It was not until 1931 when Heraeus Vacuum-schmelz of Hanau, Germany, built and operated production size furnaces for making high quality alloys that vacuum melting came of age as a production process. Alloys produced by vacuum melting exhibit unique properties, making them particularly adaptable for high temperature service. A description of this plant, recently visited by the author, the only large plant devoted exclusively to melting and pouring alloys in vacuum, is given in this article.

furnaces the refractory lining consisted of Pertinax material.

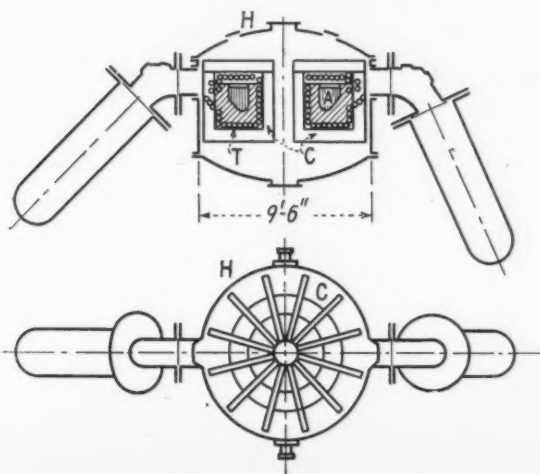
The 44-lb vacuum melting furnace, with a fused alumina lined crucible, had two 22-lb molds, one on each side at a fixed angle, all in the same structure and under vacuum. This furnace was rated at 30 kva, 450 v and 10,000 cycles. It took $\frac{3}{4}$ hr to melt the 44-lb charge, the molten metal having been held 15 min at 3 to 5 mm Hg pressure (vacuum). Then one 22-lb hot-top ingot was poured into a 2.4 in. mold. After 3 min the furnace was tilted in the opposite direction to pour the second ingot.

In processing the 4-ton charges, the metal was poured in either five molds or in one water-cooled

copper mold. Decarburization of high chromium metal charges could be secured by melting under reduced pressure, 10 mm Hg, after addition of chromium oxide to the charge. Carbon oxide gases with other gases were thus evacuated.

In 1937 a new duplex rolling mill was installed by Heraeus Vacuum-schmelze. This mill was designed by Rohn and built by Krupp at its Magdeburg plant. The two main rolls were 31.5 in. thick and 75 in. long. Each roll was operated by a separate motor, one at each side of the mill. The roll was shaped to roll octagonal ingots from a thickness of 12 in. to 6 in.

In August 1945 the author witnessed a rolling at Heraeus Vacuum-schmelze. The metal which was melted in an open high-frequency induction furnace was poured through a refractory funnel into a hot-top ingot mold. The size of this ingot was 8 in. at



LEFT

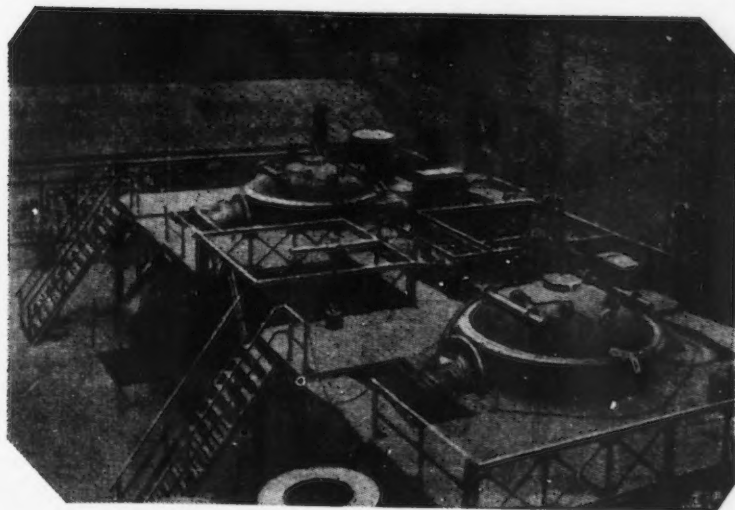
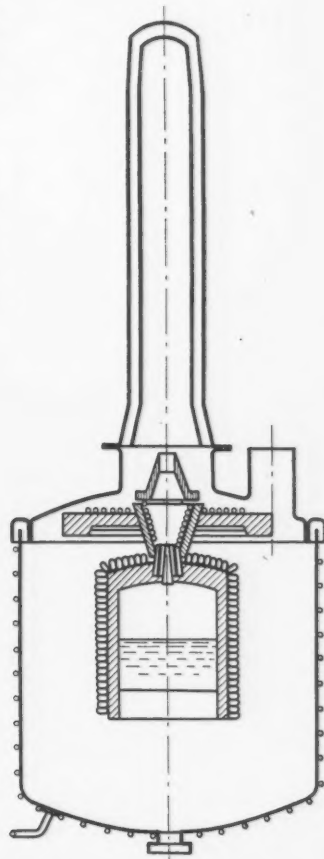
FIG. 1—Fundamental structure of the ring type, low frequency furnace for vacuum melting. A is the ring-shaped crucible where the charge is placed. T are the primary windings; C, the yokes, and H, edges where the furnace is sealed and where pipes evacuate the furnace.

LEFT BELOW

FIG. 2—Shown here are two 4-ton low frequency furnaces of the type shown in fig. 1.

RIGHT

FIG. 3—Fundamental design of a 4-ton high frequency vacuum melting furnace.



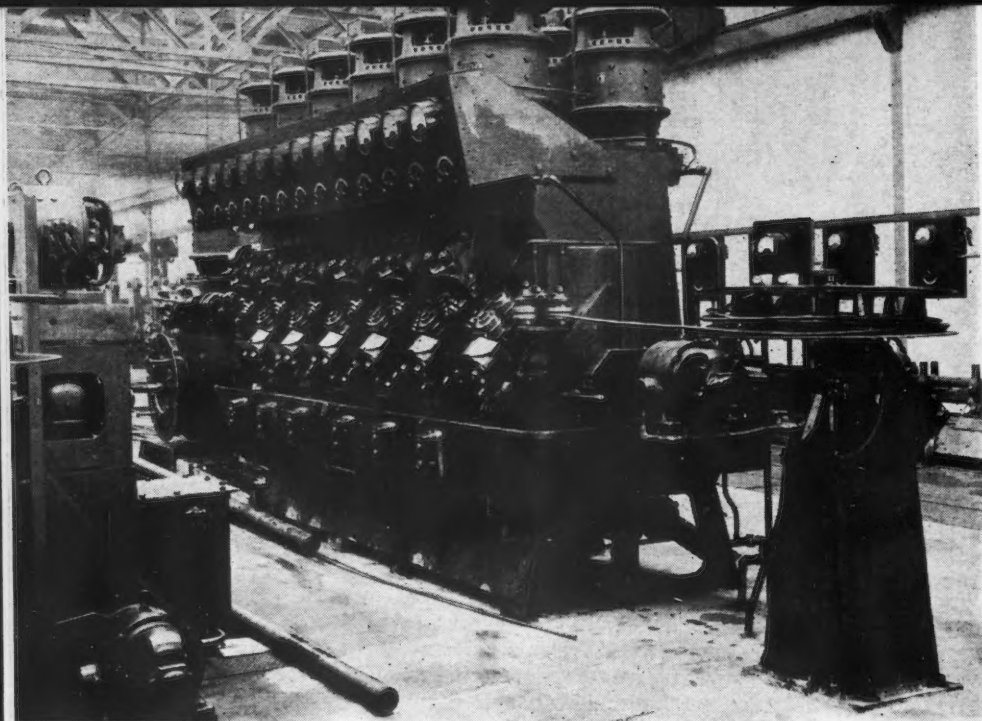


FIG. 4—Continuous wire rod mill used for rolling all of the alloys made at Heraeus Vacuumschmelze except nickel-beryllium or beryllium-copper. On this type mill octagon bars 2.4 in. in thickness were reduced to 0.6 in.

TABLE I
Physical Properties of 1 Pct Beryllium-Copper Alloys

	Tensile Strength, Psi	Elastic Limit, Psi	Elongation, Pct	Reduction In Area, Pct	Impact Resistance, Ft-Lb per Sq In.	Brinell Hardness Number	Modulus of Elasticity, 000 Psi	Specific Gravity
Soft Annealed.....	42,660-49,770	21,330	50-55	85-90	605	65-70	.....	8.6
Tempered.....	63,990-71,110	56,880	30-35	80-85	839	125-130	13,722	8.6
Hard rolled.....	106,650	102,384	6	70	699	200	.....	8.6
Heat treated from hard rolled.....	120,870	92,430	12	55	466-559	230-240	15,642	8.6

TABLE II
Physical Properties of 2 Pct Beryllium-Copper Alloys

	Tensile Strength, Psi	Elastic Limit, Psi	Elongation, Pct	Reduction In Area, Pct	Impact Resistance, Ft-Lb per Sq In.	Brinell Hardness Number	Modulus of Elasticity, 000 Psi	Specific Gravity
Soft Annealed.....	71,110-73,994	39,816	60-62	75	899	100-200	.....	8.3
Tempered.....	156,420-170,640	142,200	3-4	12.5	69.9	230-360	14,931	8.3
Hard rolled.....	120,870	115,182	6	45	372	220	.....	8.3
Heat treated from hard rolled.....	177,750	149,310	5	15	69.9	365	17,082	8.3

TABLE III
Physical Properties of Be-Co-Cu Alloys

	Tensile Strength, Psi	Elastic Limit, Psi	Elongation, Pct	Reduction In Area, Pct	Impact Resistance, Ft-Lb per Sq In.	Brinell Hardness Number	Modulus of Elasticity, 000 Psi	Specific Gravity
Soft Annealed.....	42,660-49,770	21,330	30-35	75	513	75-80	.....	8.6
Tempered.....	65,320	71,100	15-18	36	326	185-200	15,642	8.6
Hard rolled.....	76,210	76,366	6	60	372	150	.....	8.6
Heat treated from hard rolled.....	106,650	82,476	15	45	326	210	16,353	8.6

bottom, 9 in. at the hot-top junction and 43 in. long. The ingot was taken out of the mold while still hot and was rolled in the Rohn-Krupp duplex rolling mill. The ingot was rolled so soon because of a lack of gas for heating furnaces. The ingot was rolled in 10 min. from the original 8 in. to a final 4.3 in. thick octagon. It was then cut in half and rolled on a small mill to 2.4 in. The 2.4 in. octagonal bars were next rolled to 0.6 in. octagonal rods. Heraeus Vacuumschmelze had developed different rolling practices for the different types of alloys produced.

Copper-beryllium alloys containing 2.5 pct Be were rolled in a large duplex rolling mill starting with an ingot temperature of 1382°F and after 65 pct reduction, it was finished at a temperature of 1112°F. In the smaller mill the reheated billet was rolled with a starting temperature of 1382°F and finish rolled at 932°F.

Nickel-chromium alloys of the following analyses were cast in only small size ingots.

- (1) 80 pct Ni and 20 pct Cr
- (2) 60 pct Ni with 18 pct Cr and 2 pct Fe
- (3) 33 pct Ni with 20 pct Cr and 47 pct Fe

Ingots at 2246°F were rolled in the Rohn-Krupp duplex mill from a thickness of 9 in. to a finished size of 4.3 in. and a temperature of 2012°F in one heating. Next the reheated billet was rolled from 4.3 in. in thickness at 2102°F to a finished size of 2.4 in. at 1652°F.

Nickel-iron alloys containing 30 to 80 pct Ni were rolled in the duplex mill starting with 11.8 or 7.9 in. diam ingots at 2192°F and finished with 4 in. thick billets at 1652°F.

Iron-chromium-aluminum alloys of the following compositions:

- (1) 86 pct Fe with 7 pct Cr and 7 pct Al
- (2) 75 pct Fe with 20 pct Cr and 5 pct Al
- (3) 93 pct Fe with 7 pct Al

were all rolled in the small rolling mill starting with 2012°F and finished at above 1580°F. Since the alloy of 86 pct Fe with 7 pct Cr and 7 pct Al became brittle on cooling, the finishing rolling temperature could not fall below 1580°F. This alloy was reheated for 10 hr at 1832°F.

Pure nickel-manganese alloys of the compositions: 99 pct Ni with 1 pct Mn, and 98 pct Ni with 2 pct Mn and with an ingot size of 11.8 or 7.9 in. diam. were rolled in one heating with a starting temperature of 2012°F and finished at 1580°F. Nickel-manganese alloys containing 96 pct Ni and 4 pct Mn were rolled with a starting temperature of 1832°F and finished at 1580°F.

B7M alloys containing 60 pct Ni with 15 pct Cr, 16 pct Fe and 7 pct Mo were rolled slowly and with smaller drafts. Reduction of the alloy which was melted in vacuum was started at 2102°F. In those instances where the alloy was melted in an open furnace (because of impurities) rolling was started at 2192°F and finished at 1832°F. If too cold this alloy was found to crack. There was no loss of molybdenum from the surface of the billet during heating and rolling.

Thermocouple material, chromium-aluminum alloys, and chromium steels for thermocouple protecting tubes, containing 8 to 30 pct Cr (14 to 18 pct Cr most commonly) were rolled in a similar manner to the chromium-aluminum alloys. Because of the lack of heating gas the ingot had to be rolled as soon as it solidified.

Nickel-beryllium alloys containing 2 pct Be were

made in 44-lb ingots only of 3 or 2.4 in. thickness. Rolling started at 1922°F and finished at 1742°F.

All of the alloys except nickel-beryllium or copper-beryllium alloys were rolled in a continuous mill, fig. 4, from 2.4 in. thick octagonal bars at 2102°F to a finished octagon 0.6 in. thick, at a rolling temperature of 1652°F.

The copper-beryllium alloys were reheated after each rolling, starting at 1382°F and finished at 932°F in steps of:

- (1) From 2.4 in. thickness to 1.6 in. thickness
- (2) From 1.6 in. thickness to 1.2 in. thickness
- (3) From 1.2 in. thickness to 0.6 in. thickness

Contracid alloys of the analysis 60 pct Ni, 15 pct Cr, 7 pct Mo, 2 pct Mn, 15 pct Fe, 0.5 pct Si and 0.50 to 0.75 pct Be are very hard and up to now they had been cast in 22-lb ingots. Rolling of these alloys was done in several steps with reheating after each rolling. Rolling temperature was 1922°F to start and 1652°F at the finish. The alloys were rolled in octagons in the following steps:

- (1) From 2.4 in. thickness to 2.0 in. thickness
- (2) From 2.0 in. thickness to 1.7 in. thickness
- (3) From 1.7 in. thickness to 1.2 in. thickness
- (4) From 1.2 in. thickness to 0.6 in. thickness

From the final size the alloys were cold rolled to wire or flats.

Cold rolling of 0.6 in. octagons was done after the alloys had been heated for 1½ hr at 1832°F, then the cold rolling was performed in steps as follows:

- (1) From 0.6 in. to 0.55 in. octagons
- (2) From 0.55 in. to 0.47 in. octagons
- (3) From 0.47 in. to 0.33 in. octagons
- (4) From 0.33 in. to 0.22 in. octagons
- (5) From 0.22 in. to 0.13 in. octagons
- (6) From 0.13 in. to 0.08 in. octagons

The 0.08-in. size octagon was the smallest octagonal shape rolled. This was cold drawn to rounds. All dies were in one line, each die effecting a 10 pct reduction. (A 10 pct reduction in a square is equivalent to a 5 pct reduction in diameter.) The round was used as wire; the flat shape was used for watch springs. The alloy was drawn to a designated diameter and then was rolled flat to a final size of 0.04 in. wide by 0.004 in. thick. This material was then sold to watch factories for watch springs.

Heraeus Vacuumschmelze specialized in making alloys and metals for thermocouples, heating units, heat and corrosion resistance service, precision springs and high temperature service. The alloys which were made by Heraeus Vacuumschmelze could be classified as follows:

Beryllium Copper Alloys: Beryllium alloys were always melted in vacuum in order to prevent loss of beryllium. Beryllium-copper (alpha bronzes) with 1 pct Be were used for high stress bearings, contacts and springs. The alloys were annealed at 1472°F, tempered for 2 hr at 752°F and heat treated from the hardened state for 2 hr at 662°F. Physical properties of this material are given in table I.

Beryllium-copper (alpha bronzes) with 2 pct Be were used for diaphragms, brushes, leaf springs, clock and watch springs. They were annealed at 1382° to 1472°F, tempered for 4 hr at 572°F and heat treated from the hardened state for ½ to 1 hr at 572°F. Physical properties are given in table II.

Seven other beryllium-copper combinations melted in vacuum at Heraeus Vacuumschmelze were beryllium copper (alpha-beta bronze) with 2.4 pct Be; beryllium-copper-silver alloys with 5 pct Ag and 1

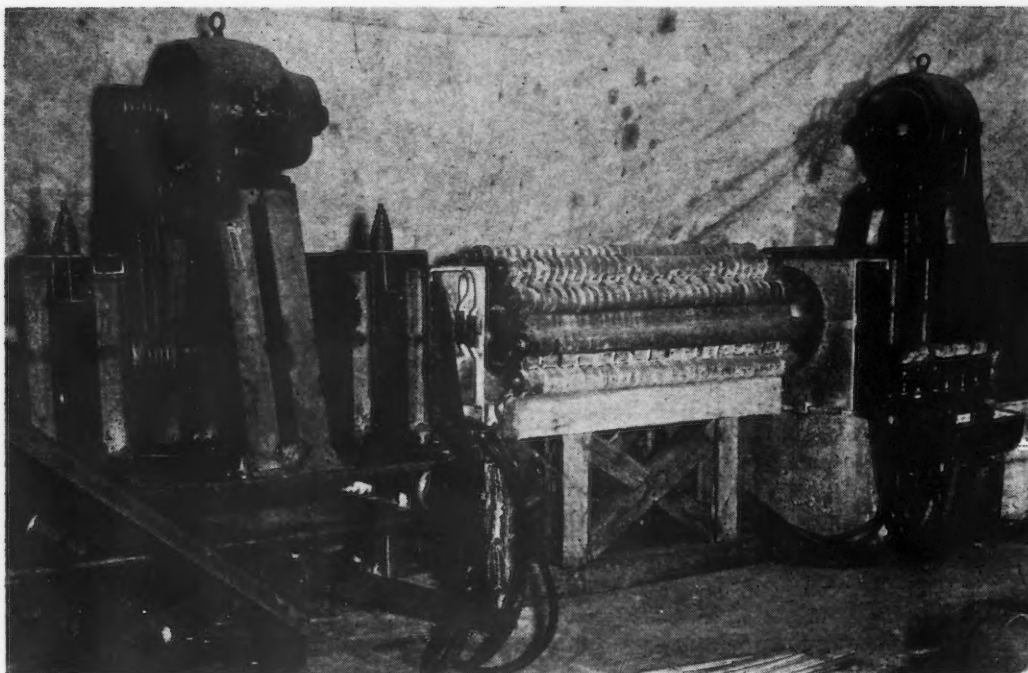


FIG. 5—With this machine, steel pipe 2.75 to 8.66 in. diam was lined with brass to make bearings. Brass and borax flux were placed inside the pipe which was then sealed and rotated at 500 rpm while being heated by high frequency current.

TABLE IV
Physical Properties of Be-Si-Al-Cu Alloys

	Tensile Strength, Psi	Elastic Limit, Psi	Elongation, Pct	Reduction In Area, Pct	Impact Resistance, Ft-Lb per Sq In.	Brinell Hardness Number	Modulus of Elasticity, 000 Psi	Specific Gravity
Soft Annealed.....	106,650	63,990	18	18	139.8	170	.....	8.0
Tempered.....	156,420	127,980	2.5	7	69.9	300	19,908	8.0
Hard rolled.....	127,980	118,026	1.5	9	46.6	229	.....	8.0
Heat treated from hard rolled.....	170,640	142,200	2.0	13	46.6	320	19,908	8.0

TABLE V
Physical Properties of Beryllium-Nickel Alloys

	Tensile Strength, Psi	Elastic Limit, Psi	Elongation, Pct	Impact Resistance, Ft-Lb per Sq In.	Brinell Hardness Number	Modulus of Elasticity, 000 Psi	Specific Gravity
Soft Annealed.....	113,760	51,192	48	330.8	140	24,885	8.1
Tempered.....	184,860	113,760	20	186.4	420	26,023	8.1
Hard rolled.....	227,520	213,300	1.5	214.4	360	25,596	8.1
Heat treated from hard rolled.....	262,070	213,300	8	209.7	480	27,018	8.1

TABLE VI
Physical Properties of the Acid Resistant Alloys

	Tensile Strength, Psi	Elastic Limit, Psi	Elongation, Pct	Impact Resistance, Ft-Lb per Sq In.	Brinell Hardness Number	Modulus of Elasticity, 000 Psi
Soft Annealed.....	125,136	59,724	30	652.4	195	22,041
Tempered.....	142,200	71,100	23	377.5	320	22,884
Hard rolled.....	213,300	199,080	2	153.8	350	24,032
Heat treated from hard rolled.....	263,070	213,300	6	130.4	450	26,307

pct Be; beryllium-silicon-copper alloys with 3 pct Si and 1 pct Be; beryllium-manganese-copper alloys with 5 pct Mn and 1 pct Be; beryllium-iron copper alloys with 10 pct Fe and 1 pct Be; beryllium-titanium-copper alloys with 3 pct Ti and 1 pct Be, and beryllium-cobalt-copper alloys with 2.6 pct Co and 0.4 pct Be. Physical properties of the last named alloy are given in table III. These alloys were used for electrodes for welding machines, brushes and contacts. They were annealed at 1652°F, tempered 4 hr at 662°F and heat treated from the hardened state for 2 hr at 842°F.

Beryllium-silicon-aluminum-copper alloys with 1.7 pct Al, 1.5 pct Si and 1.5 pct Be were used for leaf and spiral springs of all kinds. They were annealed at 1382°F, tempered for 4 hr at 662°F and heat treated from the hardened state for 2 hr at 572°F. Physical properties of these alloys are shown in table IV.

Beryllium-Nickel Alloys: Beryllium-nickel alloys with 2 pct Be were used for injection needles; diaphragms and springs. These alloys were annealed at 1832°F, tempered for 3 hr at 932°F and heat treated after hardening for 2 hr at 842°F. Physical properties are given in table V.

Beryllium-titanium-nickel alloys with 2 pct Be and 1 pct Ti were used for injector needles, valves for alkali pumps and nonrusting ball bearings. These alloys were annealed at 1832°F, tempered for 4 hr at

932°F and heat treated from the hardened state for 4 hr at 842°F. Physical properties of these Be-Ti-Ni alloys are listed in table V.

Contracid (acid resistant) alloys of the compositions given below were used for injection needles, diaphragms, for high temperature work, surgical instruments, dental bridges and valve springs.

	Alloy A Pct	Alloy B Pct		Alloy A Pct	Alloy B Pct
Ni	61.0	61.5	Mo	7.0	3.0
Cr	15.0	12.5	Be	1.0	1.0
Fe	15.0	13.5	W .....	...	3.5
Mn	2.0	2.0	Co .....	...	3.0

These alloys were annealed at 1922°F, tempered for 4 hr at 932°F and heat treated from the hardened state for 1 hr at 932°F. Properties of contradid alloys containing 7 pct Mo are shown in table V.

Heraeus Vacuumschmelze was also making bearings by lining steel pipe with brass. This process consisted of centrifugally casting brass in horizontally held pipe. The brass and borax flux were placed inside the pipe. The pipe was then closed at both ends and rotated at 500 rpm while being heated by high frequency current. Sodium titanium silicide was also used for fluxing but did not work as well as the borax. The steel pipe used in this process was 23.75 to 42.75 ft long and 3 to 10.25 in. ID. Composition of the brass used was 58 pct Cu, 1.0 to 1.5 pct Pb and the remainder zinc. Total thickness of the steel and brass lining was 0.6 in. The machine, as shown in fig. 5, could handle pipe of 2.75 to 8.66 in. diam.

LeBlond Develops Dual Drive Lathe

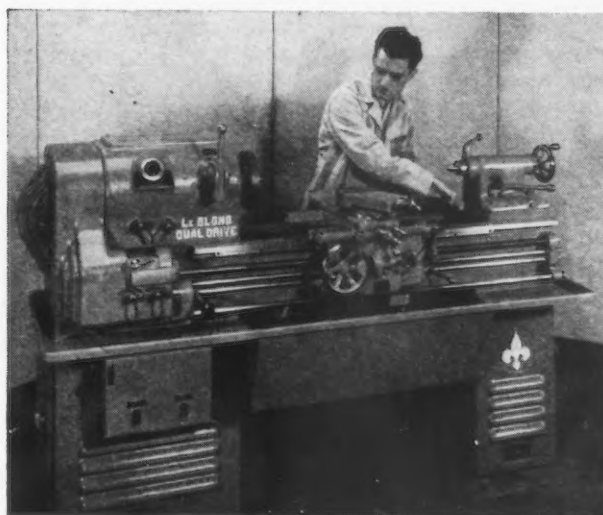
EQUIPPED with a newly designed dual driving mechanism which combines normal low speed turning ranges with the higher speeds demanded for carbide tool application, a new lathe, the LeBlond Dual Drive shown in the accompanying illustration, has been announced by the R. K. LeBlond Machine Tool Co., Cincinnati. Filling a gap between the company's heavy duty and Regal models, the machine is equally well adapted to toolroom or production work. It swings 15 in. over the bed ways, can be built with center distances starting at 30 in., and is powered by a 3 hp reversing main drive motor.

The eight speeds in the low and medium range, range from 28 to 445 rpm, and are run from the main V belt motor drive through a gear train to the spindle. The four high speeds of 540, 782, 1140 and 1800 rpm run through gear speed changes to a high speed shaft, then direct to the spindle through a second double V belt drive. Thus, for these higher speeds the heavy gear train is cut out completely, saving substantially on the wear and tear and for all practical purposes the drive is direct to the spindle. All gears are of alloy steel, hardened and shaved, and are lubricated by forced feed.

Outstanding feature of this machine is its simplicity of operation. All speed changes are controlled by a single lever. Moving this lever back and forth or right and left to bring the arrow to the desired point on the plate is all that is required. A rapid speed selector for selecting the correct spindle speeds for commonly machined metals is located on the headstock beside this lever.

The lathe is mounted on two cabinet legs, the one at the headstock end containing the main motor, and

the other at the tailstock end housing the coolant tank, pump, and a tool storage locker. Stop and start switches for the main and pump motors, and the main motor reversing switch are located in a panel attached to the headstock leg. One-shot lubrication is provided for all bearings in the one-piece apron, for the cross slide, and carriage ways. A multiple disk clutch and brake with two station control, multiple automatic length stops, and a chip pan are standard equipment. This latter is of welded sheet steel construction to save unnecessary weight, and the front edge slopes to allow adequate leg room for the operator. The back is open to facilitate chip removal.



Sampling Techniques Applied To Quality Control

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Any statistical method must, if it is to be feasible and economic, utilize a sampling technique. This is especially true in manufacturing and inspection operations where destruction testing, time, space and cost are important factors. How to make a proper sampling and select an optimum sample size from the point of view of practicality and statistical accuracy are herein discussed.

FREQUENTLY during industrial operations it becomes unfeasible to inspect each item manufactured, but it is nevertheless necessary to obtain some assurances about the quality level of the untested product. The method used to obtain such assurances is to make an investigation of a number of the items, that is, to take a sample of the entire lot. Such a procedure is termed sampling. That part of statistics which deals with the interpretation of the results obtained from the sample and the relationships which can be drawn between the sample and the entire lot from which it was drawn is termed sampling theory. If it is decided to employ sampling, then an understanding of the sampling theory is necessary as is the recognition that the technique includes implied risks since the results are subject to statistical fluctuations and do not necessarily reflect the exact constitution of the entire product output.

It does not require any lengthy thinking on the subject of sampling before the necessity of this procedure for the investigation and control of product quality is apparent. If it is assumed, for example, that the product to be considered is fire crackers (i.e., fuses, ammunition), then in order to determine whether a given lot will or will not explode upon lighting, one of two procedures is possible. Either each of the items can be fired or a sample can be taken. In the first case the knowledge is perfect, that is, the duds are separated from the good ones. The failure of the method

lies in the total consumption of the product. Thus it can be seen that sampling is a necessity when the alternative is destructive testing. Sampling becomes necessary in those cases in which total examination is physically impossible.

It often may be that 100 pct examination of a product may be so expensive as not to be warranted. Typical of such a situation would be the measurement of birefringence of glass due to strain. A manufacturer of vacuum tubes using millions of tungsten lead wires beaded with glass would be unwilling to pay for a measurement of this sort, yet he would find it highly desirable to keep the strain below a certain specified value. Sampling provides an answer to his problem. Another instance in which sampling is the answer to industry's need occurs in tests which are time and space consuming, although nondestructive.

Sampling is not the cure-all of all inspection problems. There are instances where other methods of product determination are more desirable. In such cases, a—grading or culling can either be done by automatic screening machines or b—the cost of 100 pct inspection by individuals is inexpensive relative to the cost and performance requirements of the item involved. As an example of the first case, there is separation of differently colored objects by passing them along a conveyor in front of a photoelectric cell. In the second instance, an example would be the X ray examination of airplane cylinder blocks for inclusions, blowholes or cracks. After a high initial manufacturing cost, the expense per inspection per part is relatively small. But in the event that it was desirable to evaluate the efficiency of the grading machine or the accuracy with which the X ray technician is interpreting his radiographs, then recourse to sampling should be taken.

Current literature supplies adequate descriptions of various methods of sampling¹. The four commonly accepted methods of sampling are: (1) Random; (2) stratified; (3) purposive, and (4) stratified purposive. Very briefly, these may be defined as follows:

(1) *Random sampling*—A method of selecting a

limited quantity of items from a large quantity of items, in such a way that each item selected has an equal a priori probability of being included in the sample.

- (2) *Stratified sampling*—A method of selecting a limited quantity of items from a large quantity of items, in such a way that the number of randomly selected items in any category is proportional to the total number of items in that category.
- (3) *Purposive sampling*—A method of selecting a limited quantity of items from a large quantity of items, in such a way that the selected items comprising the sample do not have an equal a priori probability of being selected, but are chosen deliberately because of some selected characteristic.
- (4) *Stratified purposive sampling*—A method of selecting a limited quantity of items from a large quantity of items, in such a way that the categories from which the sample is chosen are selected purposively but the sample units themselves are randomly selected within the various categories; the number in any category being proportional to the total number of items in that category.

Perhaps these definitions can be clarified by the following example. Suppose there is a barrel containing 100,000 roll threaded screws of various sizes, various types, and made of various materials. These barrels could be sampled by the various methods just described. To obtain a random sample of 1000 screws, the barrel could be placed on a mechanical mixing device and the screws allowed to be mixed for an arbitrary length of time, in order to produce a random distribution. For example, it could be decided to let the barrel be mixed until the telephone rang. Then a thousand screws would be selected from the barrel. Since each screw would have an equal a priori chance of being selected, it could be said that a random sample was obtained.

To obtain a stratified sample from the same barrel, the screws would first be separated into various categories such as iron, steel, brass, plastic and nickel screws. Suppose these different types occurred as follows:

Iron	60,000
Steel	30,000
Brass	5,000
Nickel	3,000
Plastic	2,000
	100,000

Then all the screws would be put back in the barrel and mixed long enough to re-establish a random distribution. At this time screws would be selected from the barrel until there was a sample of 1000 composed of the first 600 iron screws selected, the first 300 steel screws selected, the first 50 brass screws selected, the first 30 nickel screws selected and the first 20 plastic screws selected. This, then, would be a stratified sample.

To obtain a purposive sample from the barrel the purpose of the sample would first have to be decided. Assume the purpose of the sample is to examine the accuracy with which the threads are cut by measuring the pitch diameter. It would then be necessary to sift through the barrel until one screw of each type and each size, which was of exactly the correct major diameter to comprise the sample, was obtained.

To obtain a stratified purposive sample of the ac-

curacy of the threads, the procedure set forth for obtaining a purposive sample would be repeated with this exception: The sample would be comprised of screws of each type and size in the same proportion as their occurrence in the barrel, but they would be eligible for selection only if they were of exactly the correct major diameter, since this is the criterion by which units for the sample are accepted.

It has been thus far pointed out that sampling can be either destructive or nondestructive, and moreover that samples may be obtained as random, stratified, purposive, or stratified purposive selections. There is, however, another approach to the problem of sampling which is helpful in considering the main objective, that is, to obtain a sample which helps to understand the nature of the universe from which it came. One type of sampling problem is that associated with lot acceptance. This type of sampling, logically enough, is called acceptance sampling. Its purpose is to accept good lots and to reject bad lots.

A second type of sampling is directed at maintaining control of the quality of a manufactured product or a manufacturing process. This is the sampling associated with quality control charts of continuous processes. Its purpose is to indicate variations in production due to operators, materials or machines. By careful day to day examination of the quality control charts it becomes possible to anticipate and detect trends and circumvent industrial losses by prompt action. A third type of sampling is for the purpose of obtaining a concept of the quality of a given lot. This might be termed analysis sampling.

If there is a lot of 50,000 electrical resistors and it is desired to determine whether the lot is acceptable, acceptance sampling is employed. For example, under some conditions^a a random sample of 85 resistors would be taken and if they fell within the specified limits (regardless of where they fell within those limits) the lot would be accepted.

If it was quality control sampling that was required, random samples would be taken from the production line during manufacture. For example, a sample of five resistors every 30 min might be taken and each one measured. A control chart showing the average value of the five readings, and a control chart showing the range of the readings (or perhaps standard deviations from mean value) would be kept.

If the purpose was to obtain a concept of the quality of the lot, an analysis sample would be taken. In the example given, a random sample of about 100 to 200^a would be taken. The value of each unit is carefully measured and a frequency distribution curve or histogram is then drawn.

In the later sections of this article some of the problems involved in sampling for acceptance, control and analysis will be discussed but first it is important to discuss some of their common aspects.

Any inspection system (even 100 pct inspection) has in it certain inherent risks. There is always a probability, however small, that a bad unit will inadvertently be passed. In a sampling system these risks become more pronounced. The risks, briefly, are:

(1) *The consumer's risk*—that a bad product will be accepted on the basis of a chance selection.

Suppose that a sample of 100 units is taken from a lot of 3500 pieces, and it is agreed that if the sample has 15 or fewer defective, the lot will be accepted. Now, suppose further, as an extreme case, that only 85 good pieces are present in the lot. If the person

selecting the sample should by chance select 85 good pieces and 15 rejects, the lot would be accepted. Such a selection is indeed very improbable, but not at all impossible. There is a risk then that the defective lot may be accepted. This risk is termed the consumer's risk, the usual symbol for which is P_c . P_c , therefore, is the probability that the consumer will accept a product which has in it a greater fraction defective than he can tolerate. The maximum fraction defective which he can tolerate is termed the lot tolerance fraction defective, or P_L .

(2) *The producer's risk*—that a good product will be returned because of a chance selection.

Assume that a second set of circumstances exist; that the lot above described was composed of 3484 good units and 16 rejects. Now if, by chance, the sample of 100 units contained 84 good units and 16 rejects, the relatively good lot would be rejected. Here again, it should be pointed out that although such a selection is highly improbable, it is not impossible. There is a risk that the good lot may be rejected and sent back to the producer, and consequently such a risk is termed the producer's risk, the usual symbol for which is P_p .

If one is willing to accept only a product with a fraction defective no greater than some given value, then one of the factors which helps in this decision is the running quality level of the product. Thus, if a controlled process is producing work with an average fraction defective, that fraction defective is referred to as \bar{p} , process average fraction defective, or more briefly, process average. A phenomenon can be considered controlled with respect to a set of limits placed about an attribute when frequent periodic samplings give rise to statistics (describing the variations of the attribute under consideration) which do not exceed those limiting values.

Almost intuitively it can be acknowledged that if the process average fraction defective increases, then a larger size sample should be automatically taken to make sure that there exists a higher probability of rejecting a defective lot.

After sampling records are available for a period of 2 or 3 months, a convenient way of computing \bar{p} is to divide the number of defectives by the total number inspected.

In the event that no sampling records are available (because of a new process or failure to keep records of results) the simplest procedure is to establish a process average fraction defective by 100 pct inspection of that amount which would be inspected in about 2 months, for example, using the existing inspection system, but in no case more than about 5000 pieces. This is purely an empirical choice, which may or may not represent a satisfactory working basis in any particular instance.

For example, if a machine made 300 units per hr throughout an 8-hr day and the present inspection system is to inspect 5 pct of the product, then to determine the process average fraction defective, there should be inspected, based on a 22 work-day month, $300 \times 8 \times 22 \times 2 \times 0.05 = 5280$ pieces. In other words, the equivalent of about 3 days' production on a 100 pct basis should be checked.

Once the process average is established, records of future sampling will supply data for recomputing this value either periodically or on the basis of engineering information regarding process changes, such as improvements intentionally introduced or regressions due to emergencies.

To understand the meaning and difference between

the two terms AOQ, averaging outgoing quality, and AOQL, average outgoing quality limit, it is necessary to comprehend this fact: the AOQL is the limiting or maximum value which the AOQ in percent defective can attain under a specific sampling scheme. Suppose a large quantity of items, say 5000, came into the inspection department and the incoming quality was unknown. If no inspection was performed on the lot the average outgoing quality in percent defective (the AOQ) would be exactly equal to the incoming quality in percent defective. This characteristic is shown in fig. 1. The curve is a straight line. It shows what is already known, that if no inspection is performed, the incoming and outgoing qualities will be the same.

On the other hand, suppose there has been a 100 pct inspection which was 100 pct effective. The relationship between the quality before and quality after inspection would be that shown in fig. 2. In this case, regardless of the incoming quality level, the outgoing quality would have zero percent defective, and the AOQL would be zero. This is the ideal case. Its realization under the pressure and volume of mass production generally becomes highly impractical.

Suppose only a fraction of the lot is inspected. What is the relationship between the two parameters? Let the incoming quality in percent defective before inspection be P_b . Let the AOQ be P_a , quality after inspection in fraction defective. Suppose the sampling scheme provides that, after inspecting a sample size, n , from a grand lot, N , and more than c defectives are found, the balance of the grand lot, $N-n$, shall be inspected.

If a sample of size I is taken from a lot of size N and the defectives found in I are replaced, the AOQ is:

$$P_a = \frac{P_b (N - I)}{N}$$

Should the defectives not be replaced, then the lot size N is reduced by the average number of rejects found in I , i.e.,

$$P_a = \frac{P_b (N - I)}{N - P_b I}$$

A relatively small error occurs by using the expression in which the defectives are replaced.*

To determine the value of P_b for which P_a is a maximum, the expression is differentiated with respect to P_b , and then the resulting differential expression is set to equal zero and solved for P_b , remembering that I , the average number of units inspected per grand lot, is a variable which increases as the percent defective incoming quality, P_b , increases, i.e.,

$$P_a = \frac{P_b (N - I)}{N}$$

$$\frac{dP_a}{dP_b} = \frac{N - I}{N} - \frac{P_b dI}{N dP_b}$$

To find the maximum it is necessary to solve

$$\frac{N - I}{N} - \frac{P_b dI}{N dP_b} = 0$$

The symbol I represents the average quantity of units inspected per grand lot when the fraction de-

fective of the incoming material (before inspection) is P_b . It should be noted, however, that the choice of I should depend on the probability of finding a certain number of defectives, $c + I$, which in turn is determined by Poisson's exponential binomial limit* in a manner which will not be elucidated here. In other words, the greater the fraction defective before inspection, P_b , the greater is the probability that $c + I$ defectives will be found in the sample, n . If the sampling plan initially set forth is followed, then there becomes a greater and greater likelihood that

the result of 100 pct inspection. In fig. 3, the P_b v. P_a relationship is shown for various samples and various acceptance numbers, c .

Sampling schemes can usually be identified by the number of samples taken before acceptance or rejection. On this basis there are (1) single sampling, (2) double sampling and (3) multiple sampling schemes.

In single sampling the answer to this question of lot acceptance is attempted with a single sample. The method is very direct. A sample n is taken from a lot N . If more than c defectives are found, the lot is re-

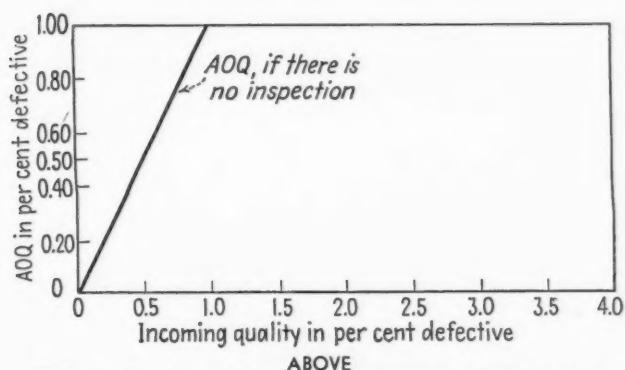


FIG. 1—The characteristic curve for average outgoing quality (AOQ) in pct defectives when there is no inspection is a straight line since the AOQ in pct defectives is exactly equal in such cases to the incoming quality.

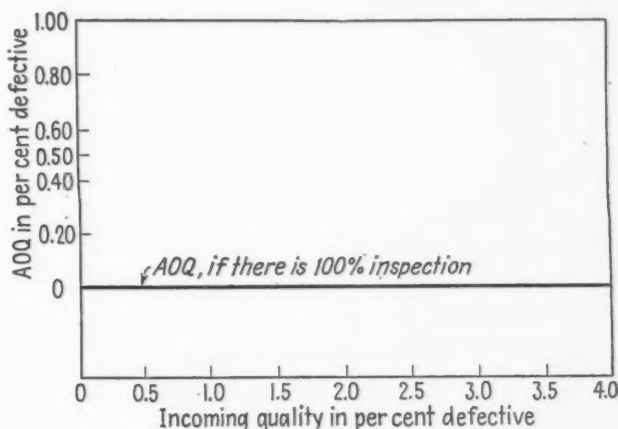


FIG. 2—When there is 100 pct inspection, the relationship between the quality before and quality after inspection is zero as shown in the curve above.

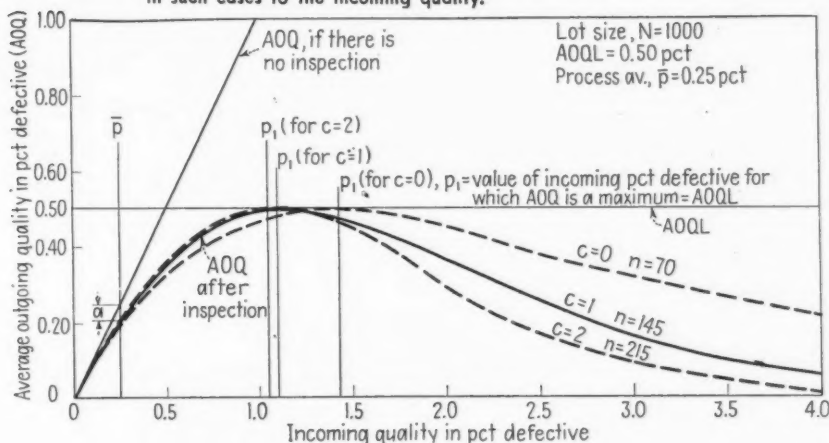


FIG. 3—Relationship between incoming quality, outgoing quality and AOQL, the average outgoing quality limit, is shown here for various samples and various acceptance numbers.

the entire balance of the grand lot would have to be inspected, in which case the fraction defective of the outgoing product is smaller on the average, that is the AOQ in fraction defective is reduced.

When the mathematical manipulations are performed, a maximum value of P_a is obtained for which $P_a = AOQL$. Such mathematical investigations have been performed by H. F. Dodge and H. R. Romig of the Bell Telephone Laboratories and there would be no point in repeating them here. The results obtained form the basis of their "Sampling Inspection Tables" cited in reference 2. Their work discloses that the number of allowable defects in a given sample for a given AOQL, depends on the process average fraction defective, that is, the fraction defective prior to inspection, P_b ; on the lot size, N , and on the desired AOQL. Anyone concerned with sampling problems will find the Dodge-Romig tables invaluable.

In fig. 1 is shown the P_b v. P_a relationship with no inspection. In fig. 2 that relationship was depicted as

rejected. If c or less defectives are found, the lot is accepted.

In the case of double sampling a first sample n_1 is taken from the lot N . If c defectives or less are found, the lot is passed. Should more than c_1 defectives be found, a second sample n_2 is taken from the balance of the lot, $N - n_1$. Sample n_2 is examined and its rejects are referred to as c' . If the total number of rejects, $c_1 + c'$, is equal to or less than some second value, c_2 , the lot is accepted. If the value of $c_1 + c'$ is greater than c_2 , the lot is rejected.

Mutiple sampling is coming into prominence again under the title of sequential sampling. Its basic idea is to continue taking small samples until the acceptance or rejection of the lot is established.

The advantages and disadvantages of the three sampling schemes mentioned are summarized in table I. Each type of sampling is best under certain conditions, such as, intelligence of inspectors, number of inspectors, personnel for record keeping, etc.

Single sampling is excellent for passing opinion on

TABLE I		
Advantages and Disadvantages of Various Sampling Schemes		
	Advantages	Disadvantages
Single Sampling	Simple	Uses most inspection
Double Sampling	Uses much less inspection than single sampling	Slightly more complicated than single sampling, suitable for use only by intelligent inspectors
Multiple Sampling	Uses least inspection	More complicated to use and record than either single or double sampling only highly intelligent inspectors can use properly

a single large lot. Double or multiple sampling, on the other hand, is excellent for passing judgment on rapidly occurring small manufactured lots presented in the order of their making; the reason for this is that the purpose of this inspection is to find in the *average* outgoing quality taken over many lots rather than in the results of a single lot only.

One of the more popular errors in setting up sampling schemes is to base them on percentages, i.e., taking a 10 pct sample and if 5 pct of the sample is bad, rejecting the lot.

What are the properties of percentage sampling? Briefly, there are four attributes worthy of note:

- (1) The fraction sampled is constant as the lot size varies.
- (2) The sample size, therefore, varies directly with the lot size.
- (3) If the lot is too small, the sample is not representative.
- (4) If the lot is too large, the sample is oversize and consequently not economic.

In contradistinction, the following might be noted about samples selected in accordance with the principles of sampling theory:

- (1) As the lot size increases, the sample size increases but not in the same proportion.

- (2) As the lot size varies between certain values, the sample size remains constant.
- (3) The sample remains representative of the lot regardless of the lot size.
- (4) The sample size is never unnecessarily large; consequently the system is economic.

To demonstrate the difference between percentage sampling and lot size sampling two lots can be considered, one of 100,000 pieces and one of 100 pieces. A percentage sampling scheme might require that a 10 pct sample be taken and the lot rejected if more than 10 pct of the sample is found to be bad. Suppose that the lot tolerance percent defective is intended to be 5 pct and that the process average fraction defective is $p = 2.5$ pct.

In the first case, a sample of 10,000 is taken and rejected if 1001 rejects are found. In the second case a sample of 10 is taken and rejected if two are bad. Intuitively it is seen that in the first case an unnecessarily large sample is taken. Likewise in the second case the sample seems unnecessarily small.

What size sample should have been taken? Consultation with the Dodge-Romig tables (table II) discloses that for $P_t = 5$ pct, and $p = 2.5$ pct, a single sampling scheme would have been devised as follows:

Lot Size	Sample Size	Allowable No. Of Defects in Sample	AOQL Pct
100	37	0	0.63
100,000	770	30	2.80

If the objective had been set on maintaining a value of AOQL, such as 2 pct, the sample size would have changed to the following taken from table III.*

Lot Size	Sample Size	Allowable No. Of Defects in Sample	P _t Pct
100	16	0	12.4
100,000	955	27	3.7

Here, then, is an important difference between percentage sampling and lot size sampling: the latter is more flexible and can be varied according to need or intent.

It is usual in the mass manufacture of a product to

TABLE II																		
Lot Tolerance Per Cent Defective = 5.0 Pct																		
Process Average, Pct	0-0.05			0.06-0.50			0.51-1.00			1.01-1.50			1.51-2.00			2.01-2.50		
Lot Size	n	c	AOQL Pct	n	c	AOQL Pct	n	c	AOQL Pct	n	c	AOQL Pct	n	c	AOQL Pct	n	c	AOQL Pct
1-30	All	0	0	All	0	0	All	0	0	All	0	0	All	0	0	All	0	0
31-50	30	0	0.49	30	0	0.49	30	0	0.49	30	0	0.49	30	0	0.49	30	0	0.49
51-100	37	0	0.63	37	0	0.63	37	0	0.63	37	0	0.63	37	0	0.63	37	0	0.63
101-200	40	0	0.74	40	0	0.74	40	0	0.74	40	0	0.74	40	0	0.74	40	0	0.74
201-300	43	0	0.74	43	0	0.74	70	1	0.92	70	1	0.92	95	2	0.99	95	2	0.99
301-400	44	0	0.74	44	0	0.74	70	1	0.99	100	2	1.0	120	3	1.1	145	4	1.1
401-600	45	0	0.75	75	1	0.95	100	2	1.1	100	2	1.1	125	3	1.2	150	4	1.2
501-600	45	0	0.76	75	1	0.98	100	2	1.1	125	3	1.2	150	4	1.3	175	5	1.3
601-800	45	0	0.77	75	1	1.0	100	2	1.2	130	3	1.2	175	5	1.4	200	6	1.4
801-1,000	45	0	0.78	75	1	1.0	105	2	1.2	155	4	1.4	180	5	1.4	225	7	1.5
1,001-2,000	45	0	0.80	75	1	1.0	130	3	1.4	180	5	1.6	230	7	1.7	280	9	1.8
2,001-3,000	75	1	1.1	105	2	1.3	135	3	1.4	210	6	1.7	280	9	1.9	370	13	2.1
3,001-4,000	75	1	1.1	105	2	1.3	160	4	1.5	210	6	1.7	305	10	2.0	420	15	2.2
4,001-5,000	75	1	1.1	105	2	1.3	160	4	1.5	235	7	1.8	330	11	2.0	440	16	2.2
5,001-7,000	75	1	1.1	105	2	1.3	185	5	1.7	260	8	1.9	350	12	2.2	490	18	2.4
7,001-10,000	75	1	1.1	105	2	1.3	185	5	1.7	260	8	1.9	380	13	2.2	535	20	2.5
10,001-20,000	75	1	1.1	135	3	1.4	210	6	1.8	285	9	2.0	425	15	2.3	610	23	2.6
20,001-50,000	75	1	1.1	135	3	1.4	235	7	1.9	305	10	2.1	470	17	2.4	700	27	2.7
50,001-100,000	75	1	1.1	160	4	1.6	235	7	1.9	355	12	2.2	515	19	2.5	770	30	2.8

n = Size of sample; entry of "All" indicates that each piece in lot is to be inspected.

c = Allowable defect number for sample.

AOQL = Average outgoing quality limit.

n = Size of sample; entry of "All" indicates that each piece in lot is to be inspected.
c = Allowable defect number for sample.
AOQL = Average outgoing quality limit.

TABLE III
Average Outgoing Quality Limit = 2.0 Pct

Process Average, Pct	0-0.04			0.05-0.40			0.41-0.80			0.81-1.20			1.21-1.80			1.81-2.00		
Lot Size	n	c	Pct	n	c	Pct	n	c	Pct	n	c	Pct	n	c	Pct	n	c	Pct
1-15	All	0	—	All	0	—	All	0	—	All	0	—	All	0	—	All	0	—
16-50	14	0	13.6	14	0	13.6	14	0	13.6	14	0	13.6	14	0	13.6	14	0	13.6
51-100	16	0	12.4	16	0	12.4	16	0	12.4	16	0	12.4	16	0	12.4	16	0	12.4
101-200	17	0	12.2	17	0	12.2	17	0	12.2	17	0	12.2	35	1	10.5	35	1	10.5
201-300	17	0	12.3	17	0	12.3	17	0	12.3	37	1	10.2	37	1	10.2	37	1	10.2
301-400	18	0	11.8	18	0	11.8	38	1	10.0	38	1	10.0	38	1	10.0	60	2	8.5
401-500	18	0	11.9	18	0	11.9	39	1	9.8	39	1	9.8	60	2	8.6	60	2	8.6
501-600	18	0	11.9	18	0	11.9	39	1	9.8	39	1	9.8	60	2	8.6	60	2	8.6
601-800	18	0	11.9	40	1	9.6	40	1	9.6	65	2	8.0	65	2	8.0	85	3	7.5
801-1,000	18	0	12.0	40	1	9.6	40	1	9.6	65	2	8.1	65	2	8.1	90	3	7.4
1,001-2,000	18	0	12.0	41	1	9.4	65	2	8.2	65	2	8.2	95	3	7.0	120	4	6.5
2,001-3,000	18	0	12.0	41	1	9.4	65	2	8.2	95	3	7.0	120	4	6.5	180	6	5.8
3,001-4,000	18	0	12.0	42	1	9.3	65	2	8.2	95	3	7.0	155	5	6.0	210	7	5.5
4,001-5,000	18	0	12.0	42	1	9.3	70	2	7.5	125	4	6.4	155	5	6.0	245	8	5.3
5,001-7,000	18	0	12.0	42	1	9.3	95	3	7.0	125	4	6.4	185	6	5.6	280	9	5.1
7,001-10,000	42	1	9.3	70	2	7.5	95	3	7.0	155	5	6.0	220	7	5.4	350	11	4.8
10,001-20,000	42	1	9.3	70	2	7.6	95	3	7.0	190	6	5.6	230	9	4.9	460	14	4.4
20,001-50,000	42	1	9.3	70	2	7.6	125	4	6.4	220	7	5.4	385	12	4.6	720	21	3.9
50,001-100,000	42	1	9.3	95	3	7.0	160	5	5.9	290	9	4.9	505	15	4.2	955	27	3.7

sample periodically the production line at various points for the purpose of ascertaining the quality of the product. This type of sampling problem presents some aspects distinct from other types of sampling

*Tables II and III are Dodge-Romig tables. See Bell Telephone Journal, January, 1941. Table II in this article is Dodge-Romig table SA-2.0; table III is table SL-5.

problems. For one thing, it must be fast. For another, it must not interfere with the factory flow of materials. Furthermore, it can be effective only where the full cooperation of the foremen is obtained, and this last is a hopeless proposition unless the system is accurate. In the final analysis, the test of a quality control sampling scheme is "does it work?" Does it help the foremen obtain and maintain good quality production? The answers to these questions are yes provided the system is chosen in such a way as to be capable of supplying accurate forecasts.

By means of suitable mathematical techniques it becomes possible to interpret the results of small samples with excellent accuracy.* The conclusions derived from this analysis are summarized in the table following. Column 1 gives the sample size; column 2 gives (as an example) the values $A3\sigma$ by which the average value of the range \bar{R} must be multiplied in order to obtain the term which must be added to and subtracted from \bar{X} (the average of the average value of a number of samples) in order to obtain the 3σ control limit, where σ is the standard deviation of statistical theory; i.e., only seven out of 10,000 would lie outside the limit values if only chance causes exist.**

Sample Size	$A3\sigma$
2	1.880
3	1.023
4	.729
5	.577
6	.483
7	.419
8	.373
9	.337
10	.308
11	.285
12	.266
13	.249
14	.235
15	.223

As a demonstration, the following values can be assumed:..... $\bar{X}=27.3$
 $R=10.6$
 $n=10$

The 3σ limits would then be $\bar{X} \pm 0.308$ (10.6)
 $=27.3 \pm 3.26$
 $=30.56$ and 24.04

This means that if some number of samples of 10 each were taken (i.e., $n = 10$) and the average of each sample of 10 was \bar{X} , then the average of these aver-

** In this statistical symbolism, a bar above a symbol represents the arithmetic mean value of the symbol, that is, \bar{X} is the average value of X ; $\bar{\bar{X}}$ is the average value of \bar{X} , i.e., the average of the averages of X . In this problem a normal distribution is assumed.

ages, $\bar{\bar{X}}$ would be evaluated and the indicated computations done in order to determine the 3σ limits about the value $\bar{\bar{X}}$.

Because of the mathematical work done on the interpretation of the average values of samples it becomes possible to obtain an accurate picture of the lot from which they come.

The values of $A3\sigma$ are predicated on the applicability of normal distribution theory. It is only natural, then, that these questions should arise: (1) Prior to sampling, how can it be known that the quality being examined is normally distributed? (2) If the distribution is not normal, what good are these computations?

To answer the first question, it is not known prior to sampling whether a normal distribution exists. A sample of some 2000 to 6000 pieces would have to be analyzed to answer this question and then it would be a stroke of sheer luck if a perfectly normal distribution were found. This leads to the answer to the second question; namely, if the distribution is not normal (and most distributions are not) it has been found that the computations usually are excellent first approximations of the true statistics of the actual distributions.

The fact of the matter is that the assumption that the distribution is normal in most industrial problems can be made with relative impunity. In instances
(CONTINUED ON PAGE 136A)

Effect of Particle Size on Iron Po

CURVES were plotted of compression ratio v. particle size for each of the four powders at the two standard pressures and are shown in fig. 3. Since the values (table IV) are computed as the ratio between green density and apparent density for each specific fraction, the curves are an expression of this mathematical ratio. Powder D has the lowest compression ratio since its apparent density is so much higher than the other powders. Powder A has the highest compression ratio in the coarser fractions, although powders A, B, and C have approximately the same values in the finer fractions. It is difficult to state with certainty the effect of particle size on the compression ratio. The effect of pressure is to merely

This article, which covers an OPRD wartime research project, was prepared by the following members of the staff of the Metal Powder Laboratory, Stevens Institute of Technology, Hoboken, N. J.: J. F. Kuzmick, former assistant director, J. D. Shaw, assistant director, and C. L. Clark, T. W. Frank, W. V. Knopp and A. S. Margolies, research fellows. The authors have expressed appreciation to G. J. Comstock, director, for his guidance and direction in the investigation reported herein.—Ed.

displace the curves; the higher pressure resulted in higher compression ratios (since the green densities are higher at the increased pressure). In general, where the green density is fairly constant for decreasing particle size, the compression ratio is inversely proportional to the apparent density by nature of the mathematical ratio.

Green Strength—A study of the green strength

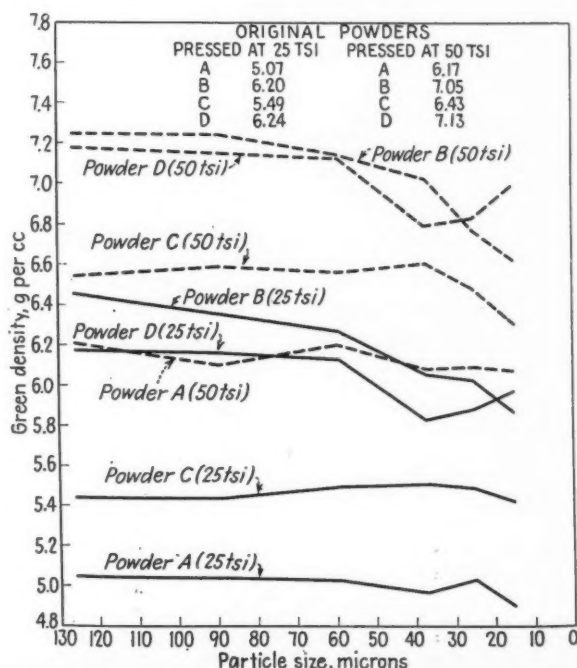
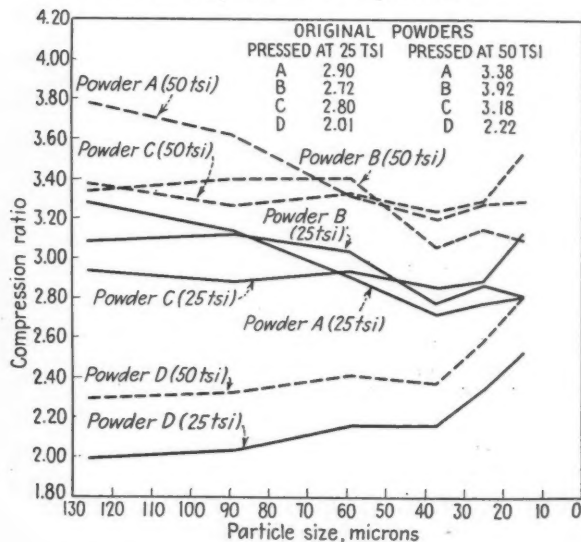
values (table V) does not allow any conclusions to be drawn on the effect of particle size, since the results are indecisive. The actual weight losses found were extremely small when considered in relation to the possible sources of experimental error. As would be expected, the compacts pressed at 50 tons per sq in. had better green strengths (lower weight losses) than those pressed at 25 tons per sq in. While there appears to be no difference among the powders when they are pressed at 50 tons per sq in., the reduced powder compacts have somewhat better green strengths than those of the electrolytic powders at the lower compacting pressure of 25 tons per sq in.

Green and Sintered Densities—Green density values for each fraction at each of the two standard pressures for all four powders are plotted in fig. 4.

Particle size has no effect on the reduced powders (A and C), since the green densities remain substantially constant with decreasing particle size at both pressures. Electrolytic powder B shows decreasing density with decreasing particle size, which would be the expected trend since the finer particles have greater opportunity for bridging. The other electrolytic powder, D, also reveals a density curve decreasing with decreasing particle size except for a minimum at about 38 microns. The reduced powders, A and C, do not follow very closely the expected trend which the electrolytic powders showed. Therefore, it seems indicated that the individual particles of the

RIGHT
FIG. 4—Green density v. particle size.

BELOW
FIG. 3—Compression ratio v. particle size.



Powder Properties . . .

The extensive investigation of the effect of particle size on iron powder properties conducted by the authors revealed that the following properties significantly affected were: Powders—(1) apparent density, (2) relative flow, and (3) weight loss in hydrogen; powder compacts—(1) compressibility ratio, (2) dimensional change on sintering, and (3) tensile strength. Particle size exhibited little influence on the hardness, green density and sintered density of iron compacts. The pronounced effects of subsieve fractions on physical properties have led the authors to emphasize, in this concluding part of a two-part article, the need for a method of analyzing distribution of subsieve particles.

finer fractions of the reduced powders (A and C) have a greater density or different shape than those of the coarse fractions.

The effect of pressure is to displace the curves, the higher pressure resulting in greater densities. At 25 tons per sq in. pressure, powder B has the higher densities for the individual fractions, although the original powder B is slightly denser than the original powder. The finer fractions of powder D appear to increase the density of the coarse fractions. At 50 tons per sq in. pressure, powders B and D parallel each other in green density fairly closely fraction for fraction—except for fraction G of powder D which shows higher density than fraction G of powder B. The electrolytic powders (B and D) are denser in all fractions (and in the original powders) than the reduced powders (A and C).

A study of data plotted in fig. 5 shows that, with all powders, sintered density is substantially constant for the sieve fractions (B, C, and D). In the subsieve fractions; powder A is still substantially constant, powder B shows a slight (8 pct) decrease, powder C shows a slight (6 pct) decrease, and powder D decreases at fraction E and then increases again. In general, the sintered density curves follow very closely the green density curves (fig. 4) and the effect of particle size is not appreciable. The densities of original powders A, C, and D are approximately the same as those of the coarse fractions; powder B is the only powder in which the sintered density of the original powder is lowered by the fine particles and it is of interest to note that the percentage of fines (table II) is sufficient to make their presence felt.

Powder A is the only powder which shows an appre-

RIGHT
FIG. 6—Dimensional change (length) on sintering v. particle size.

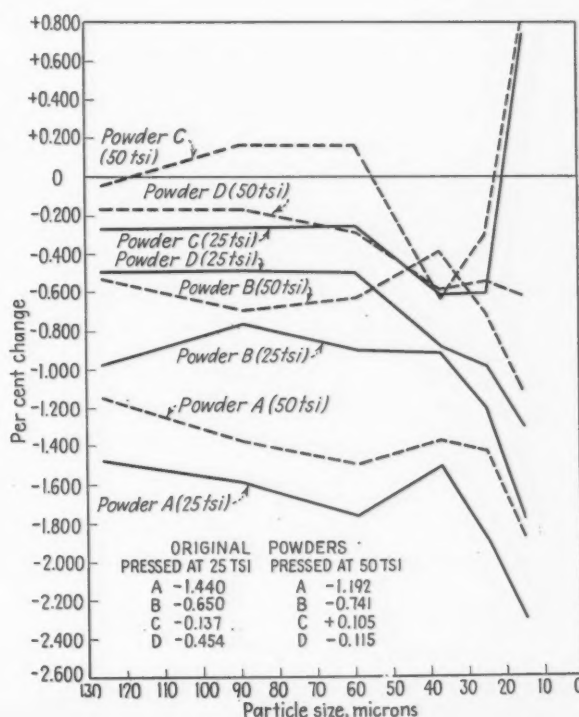
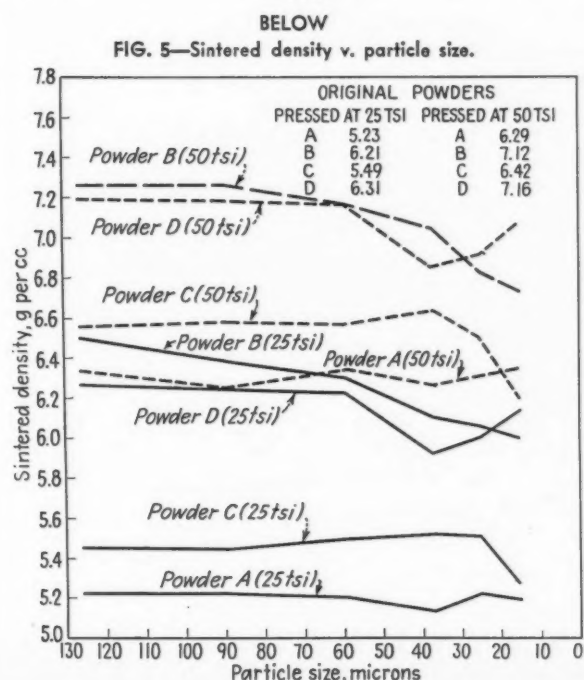


TABLE IV
Compression Ratio
Compacting Pressure, 25 tons per sq in.
POWDER
A B C D
A (original) 2.90 2.72 2.80 2.01
B 3.27 3.08 2.93 1.99
C 3.13 3.12 2.88 2.03
D 2.90 3.03 2.83 2.16
E 2.72 2.77 2.85 2.16
F 2.77 2.86 2.88 2.34
G 2.80 2.80 3.12 2.82
50 tons per sq in.
A (original) 3.38 2.92 3.18 2.22
B 3.77 3.33 3.37 2.29
C 3.61 3.39 3.26 2.32
D 3.31 3.40 3.32 2.41
E 3.19 3.05 3.23 2.37
F 3.27 3.14 3.26 2.58
G 3.28 3.09 3.51 2.80

ciable increase in density upon sintering; it has the greatest shrinkage (figs. 6 and 7), which would explain the increase in density. Both electrolytic powders (B and D) show greater sintered density than the reduced powders (A and C) at both pressures. On the original powders and all fractions, the effect of increased pressure is to increase the sintered density.

Dimensional Change — Curves were plotted of change in length and in diameter versus particle size in microns and are shown in figs. 6 and 7. In general, both the diameter and length show increasing shrinkage with decrease in particle size. Powder C shows an increasing expansion in length for the two finest fractions at both pressures. This may be due to the very high oxide content of the finest fractions which may cause the expansion in the pressing direction from the gases generated.

It is interesting to note that, while both reduced powders A and C have about the same weight loss in hydrogen for the original powder, 1.233 pct for A and 1.213 pct for C, the former shows the greatest shrinkage in both length and diameter, while powder C shows the lowest shrinkage of all powders in length and much lower shrinkage in diameter than powder A. This may be due to a difference in the character of the oxide in each case. That is, whether it is in the form of surface films or internal inclusions. A difference in oxide distribution among the fractions

TABLE V
Green Strength
(percent weight loss)
Compacting Pressure, 25 tons per sq in.
POWDER
A B C D*
A (original) 0.242 0.779 0.509 0.723
B 0.149 1.448 0.322 0.692
C 0.225 0.781 0.393 0.784
D 0.345 0.556 0.304 0.604
E 0.363 0.990 0.382 1.308
F 0.671 1.014 0.613 1.738
G 0.667 0.942 0.373 2.165
50 tons per sq in.
A (original) 0.104 0.135 0.155 0.112
B 0.086 0.293 0.092 0.093
C 0.074 0.227 0.183 0.121
D 0.103 0.132 0.155 0.114
E 0.123 0.324 0.141 0.379
F 0.151 0.334 0.228 0.387
G 0.196 0.243 0.187 0.486
*One half the number of revolutions of the other three powders.

may also have some effect; in the case of powder C, the finest two fractions contain a considerable proportion of the oxide content.

In general, it can be seen that the fine (subsieve) fractions exert the greatest influence on dimensional change, since all curves are fairly constant for the sieve fractions. This indicates that the finest fractions must be carefully controlled as to quality and amount present if close dimensional control of the sintered product is to be achieved.

Hardness—Results of hardness testing are shown in table VI. On the cylindrical specimens, Rockwell hardness was measured on the top surface, on the bottom surface, and at the center along the length. On the tensile specimens, the hardness measurements were made on the top and bottom surfaces only.

A study of table VI reveals that, in general, particle size had little effect on the hardness of the sintered specimens. No particular trend is seen. The hardness readings on the 50 tons per sq in. specimens are higher than on the 25 tons per sq in. specimens and this is to be expected because of greater density. With few exceptions, hardness on the surface of the tensile specimens and on the top and bottom surfaces of the cylindrical specimens are approximately the same. Hardness at the center along the length of the cylindrical specimens, however, tends to be lower. This is explained by the fact that in thick metal powder compacts the sections furthest away from the press plungers are more porous.

Tensile Strength and Elongation—Tensile strength results at both pressures of 25 and 50 tons per sq in. for all fractions of the four powders are given in table VII. Curves were plotted of tensile strength versus average particle size in microns for each pressure and are shown in fig. 8.

As would be expected, it can be seen that, for any one powder or fraction, the tensile strength values at 50 tons per sq in. are higher than those at 25 tons per sq in. For both pressures, the electrolytic powders B and D have higher tensile strengths than the reduced powders A and C. At 25 tons per sq in. powder B tends to be stronger than powder D; at 50 tons per sq in. the reverse is true.

With few exceptions tensile strength values of fractions B through F increase with decreasing particle size. However in powders A, C, and D, fraction G (+10 -20 microns) is lower in strength than fraction F (+20 -30 microns). Since fraction G has a higher oxide content, it is probable that this oxide produces a reduction in tensile strength which more than compensates for any possible increase due to decreasing particle size. In powder B, where fraction G has a higher tensile strength than fraction F, the effect of increased fineness of fraction G is apparently of such a degree that, although the oxide content of fraction G is higher than that of fraction F, fraction G still possesses a higher tensile strength.

An unusual condition is found in powder C where the tensile strength of the original powder is only half that of fraction F (+20 -30 microns). Since powder C has the lowest amount of subsieve material (24.26 pct) of the four iron powders under test, relatively less improvement in the tensile strength of the original powder results from the presence of subsieve material (-325 mesh). Furthermore, fractions B, C, and D show unusually low values for tensile strength, and the presence of these fractions results in an ap-

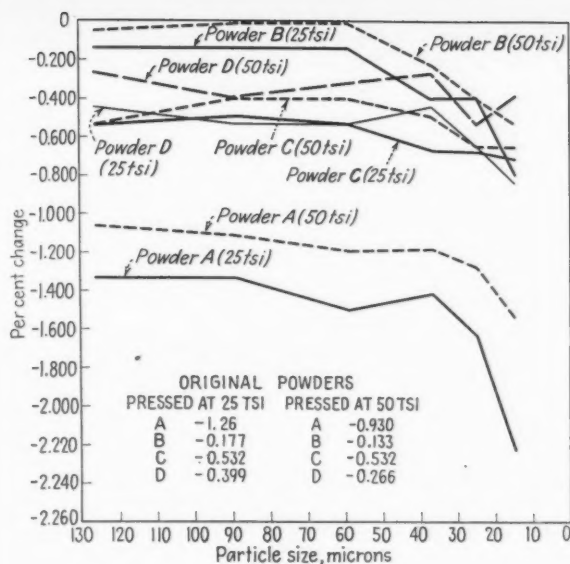


FIG. 7—Dimensional change (diameter) on sintering v. particle size.

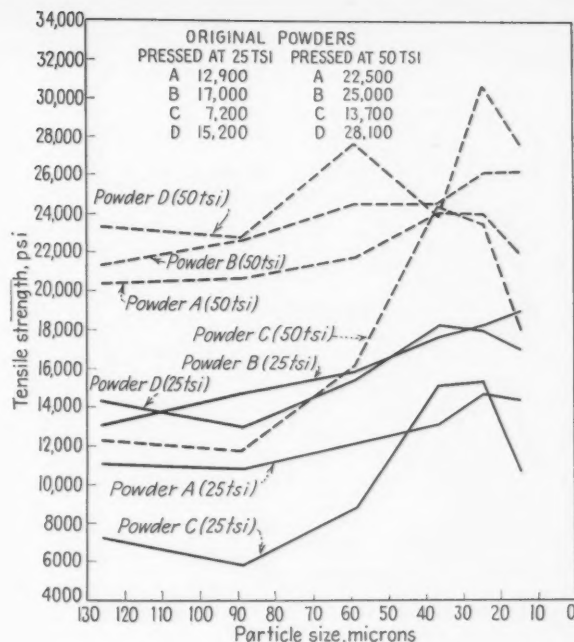


FIG. 8—Tensile strength v. particle size.

precipably lowered tensile strength in the original powder.

The measured values for elongation in 1 in. are given in table VII. No particular trend in elongation with decreasing particle size was found. The electrolytic powders B and D have greater elongation values than the reduced powders A and C.

Except for powder C, higher pressure (50 tons per sq in.) produced increased elongation in all cases. For powder C the higher pressure resulted in increased elongation values for fractions D through G while fractions B and C and the original powder were not appreciably affected. It is apparent here, as with tensile strength, that the low elongation values of the

original powder result from the influence of the coarser fractions, all of which show little elongation in the tensile specimens.

Conclusions

The results of the tests performed in this project demonstrate that particle size of iron powder has considerable influence on many of the properties of the powder and its compacts. Significantly affected were the following:

Powders	Compacts
Apparent density	Compressibility ratio
Relative flow	Dimensional change on sintering
Weight loss in hydrogen	Tensile strength

On the other hand, particle size had little influence on the hardness, green density, and sintered density of iron powder compacts. Results determined for elongation and green strength were inconclusive.

The results of this program show that control of iron powder particle size is necessary for the maintenance of consistent physical property values. Of es-

TABLE VI
Rockwell Hardness—H Scale (1/8 in. ball—60 kg load)

Compacting Pressure, 25 tons per sq in.	POWDERS											
	A			B			C			D		
	Tensile Specimen	Top and Bottom	Side	Tensile Specimen	Top and Bottom	Side	Tensile Specimen	Top and Bottom	Side	Tensile Specimen	Top and Bottom	Side
Fraction												
A (original)	40	30	21	54	31	31	38	40	27	50	49	38
B	45	27	17	47	48	46	41	39	20	47	39	33
C	34	27	18	48	45	43	33	36	22	47	40	32
D	41	32	19	48	45	44	36	44	32	57	46	38
E	43	27	16	56	42	37	55	47	38	56	38	29
F	47	35	24	54	43	42	54	49	40	46	43	36
G	50	38	28	55	54	51	40	33	28	53	60	54
Compacting Pressure, 50 tons per sq in.												
A (original)	74	69	66	78	79	72	74	70	63	81	81	74
B	75	65	65	75	79	72	73	71	64	80	79	74
C	72	66	63	76	79	75	74	71	64	80	78	73
D	75	74	67	76	78	74	70	73	67	80	80	75
E	73	69	63	75	78	73	80	80	73	76	74	68
F	76	72	67	77	74	72	78	77	71	84	78	72
G	79	78	75	78	77	75	65	64	61	80	89	84

TABLE VII								
Tensile Strength and Elongation								
Compacting Pressure, 25 tons per sq in.	POWDERS							
	A		B		C		D	
	Fraction	Tensile Strength, Psi	Elongation, Pct	Tensile Strength, Psi	Elongation, Pct	Tensile Strength, Psi	Elongation, Pct	Tensile Strength, Psi
	A (original)	12,900	6	17,000	9	7,200	2	15,200
	B	11,100	4	13,100	6	7,200	2	14,400
	C	10,800	5	14,800	8	5,800	2	13,000
	D	12,200	4	15,900	9	8,800	1	15,500
	E	13,100	5	17,700	10	15,200	5	18,300
	F	14,700	4	18,300	11	15,400	5	18,100
	G	14,400	4	19,000	12	10,700	3	17,100
Compacting Pressure, 50 tons per sq in.	A (original)	22,500	8	25,000	14	13,700	2	28,100
	B	20,400	6	21,400	13	12,300	3	23,400
	C	20,700	6	22,800	15	11,800	1	22,800
	D	21,800	8	24,600	14	16,200	3	27,700
	E	24,100	8	24,600	11	24,600	8	24,000
	F	24,100	8	26,200	14	23,600	8	30,800
	G	22,000	8	26,300	15	18,000	5	27,700

pecial importance is the fact that of all the fractions tested, the subsieve fractions have the greatest effect on the properties of the original powder. Since commercial iron powders, usually produced to a definite sieve analysis, often contain as much as 50 pct by weight of subsieve material (—325 mesh), need is indicated for careful checking of the subsieve particle size distribution as well as the sieve distribution.

It should be emphasized that the term “particle size” as used herein includes other particle characteristics (that is, degree of cold working in manufacture, individual density, individual shape). These other

characteristics probably have in some instances masked the true effect of particle size. For commercial application the results outlined can be of direct value. A complete scientific evaluation of the effect of particle size, however, must give weight to the other characteristics yielding, if possible, a quantitative measure of their confounding effect. In this respect microscopic examination of the powders and their compacts clearly is needed. Also, there was insufficient time to test blends of the various powder fractions, and such a study might have indicated the allowable tolerance in particle size distribution.

Vertical Normalizing Furnace for Strip Steel

A VERTICAL furnace for normalizing steel strip is under construction at a steel works in the east of France, according to a report published in the *Engineers' Digest*, New York, September, 1946. The furnace is designed for a temperature of 1800°F and for production of 660 lb per hr of mild steel strip of 0.004 to 0.06 in. thickness and 15.75 in. maximum width.

The reels are so arranged that several strips of smaller width can be passed side by side through the furnace. Furnaces of this type can be built for strip of greater width without difficulty. For local as well as economic reasons, combined electric and gas heating is provided, gas-heated radiant tubes being used in the preheating zone in which the strip is heated to 1290° to 1470°F. In the installation referred to, the heating gas is supplied from a producer gas plant which does not allow the attainment of preheat temperatures in excess of 1380°F.

The strip entering at the bottom of the furnace passes first through the preheating zone in which it is heated by the radiant gas-fired tubes. It is then passed through the final heating and temperature equalizing zone where it is heated by means of electrical resistor elements which raise the temperature of the strip from 1290° to about 1705°F. Immediately upon leaving the equalizing zone the strip is abruptly cooled in a cooling zone, which is in the shape of a

jacketed muffle with cooling water circulating through the jackets. Actually the cooling zone is served by several jackets, the individual water supply of which is so adjusted that the strip leaves the furnace at a temperature low enough to preclude its discoloration. An exit temperature of the strip of 265° to 300°F is used to keep the cooling zone at reasonable length. An air blower is provided to cool the sheet to about 105°F before it is wound upon the reel.

Provision is made for the use of a controlled atmosphere consisting of the products of combustion of ammonia. Drying of these combustion products is not resorted to, since the presence of humidity does not affect mild steel strip. Special precautions are taken to prevent the escape of protective gas at the points where the strip enters and leaves the furnace.

A highly accurate automatic temperature control gear is provided, which controls solely the electrical heater part and which incorporates a radiation pyrometer for measuring the temperature of the strip at a point where it leaves the equalizing zone.

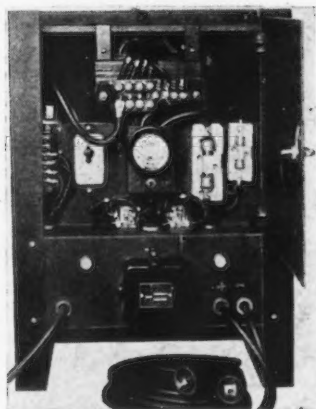
As the gas-heated zone serves only to preheat the strip it is not equipped with automatic temperature control as such. There is, however, a gas flow controller which is actuated by a thermocouple located in the vicinity of the radiant tubes. This controller acts as a protective device.

New Equipment...

Plant Service

Industrial truck battery chargers, pressure blowers, tank breathers, rotary pumps and various types of valves and couplings are described in this week's review. Other items of general plant utility included in this report are talking bulletin boards, filing cabinets, and water coolers.

AN AUTOMATIC two-rate industrial truck battery charger to provide rapid, unattended charging for either lead-acid or Edison type batteries has been designed by *Federal Telephone & Radio Corp.*, Newark, N. J. The charger, known as FTR 9202-AS, plugs into any 105 to 125 v, single phase, 60 cycle ac supply line. It will charge six-cell, 250 amp-hr, lead-acid batteries to their full capacity in 8 hr and the ten-cell, 250 amp-hr



Edison batteries in 7 hr. This automatic charging method is said to prolong the life of batteries by preventing overheating, purging of plates, and excessive gassing. The charger can be mounted in a space of less than 2 sq ft and can be installed on floor, wall or bench. The desired charging cycle is controlled by a toggle switch, and a time switch is set at the number of hours required for the charge.

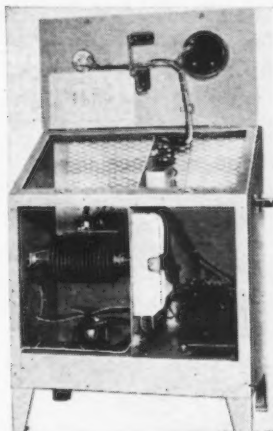
Truck Battery Charger

FOR direct current charging of motorized lift truck batteries in either lead-acid or nickel-iron types, a fully automatic motor generator set has been announced by the *Motor Generator Corp.*, Troy, Ohio. The generator is 15 to 16 v, dc, 50 amp, $\frac{3}{4}$ kw diverter pole type, conservatively rated and built as an integral

unit with a 3-phase, ac 220 to 440 v, 60 cycle, $1\frac{1}{2}$ -hp squirrel cage induction, ball bearing motor. The control cabinet houses an ammeter, resistance coil, magnetic motor starting switch, reverse current cutout and interval timer. One 10-ft 3-conductor power cable and a 6-ft 2-conductor battery charging cable are furnished, making possible the charging of batteries without lifting them from the truck. This automatic machine is designed for the modified constant voltage charging of one 6-cell 250 amp-hr battery in 8 hr.

Selenium Battery Charger

ON-THE-SPOT charging of batteries by untrained attendants is said to be possible with a selenium battery charger announced by *Automatic Transportation Co.*, 149 W. 87th St., Chicago 20. The selenium charger has been designed to charge batteries for the company's motorized hand truck and

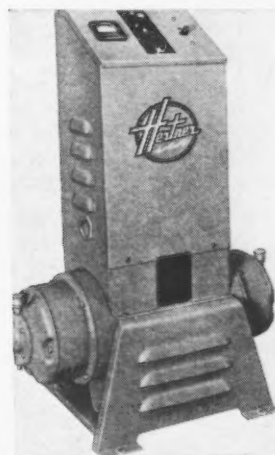


tractor. Completely automatic, the unit charges the batteries from electric outlets by connecting the battery to the charger and setting the time clock. The clock regulates length of charge and automatically terminates the charge. The chargers are available for operation from three standard ac lines of 110 to 115

v, or 220 to 230 v, 60 cycle single phase, and 110 to 115 v, 25 cycle single phase.

Motor-Generator Charger

MODEL H fully-automatic motor-generator charger for motorized lift trucks has been announced by the *Hertner Electric Co.*, 12718 Elmwood Ave., Cleveland. The unit, consisting of a motor-generator set on which are



mounted the controls and control panel, is designed for charging six-cell lead-acid batteries in 8 hr and ten-cell Edison batteries in 7 hr. Batteries charged range from 250 to 550 amp-hr for lead acid type and from 225 to 450 amp-hr for the nickel-alkaline type. Units can be supplied for various current requirements; standard units are designed for 220 to 440 or 550 v, 2 or 3 phase 60 cycle ac.

Pressure Blowers

DESIGNED for use as man-coolers and in industrial ventilating applications where a large volume of low pressure air is needed, a series of direct drive, corrosion resistant, axial flow pressure blowers have been produced by the *Moore Co.*, 544 Westport Rd., Kansas City 2. These blowers are of

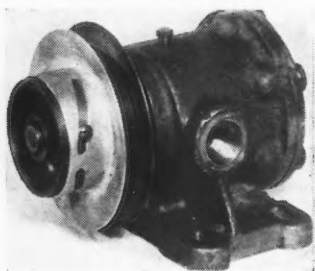
two basic groups, the series 16 indicating a 16-in. hub and the series 24 with 24-in. hub. The outstanding feature of both series is the fabricated Monel metal construction incorporating spherical hub and ring design. This spherical



construction allows each blower to be made to provide maximum efficiency for each set of performance requirements. Number of blades, blade pitch setting, guide vane setting, motor speed and horsepower are the factors involved. A weather-proof, nonoverloading, direct drive motor is manufactured especially for these units, in speeds from 300 to 1800 rpm and in 1 to 60 hp. Motors are mounted on synthetic rubber shock mounts and are completely enclosed within the hub and housing. Ventilating air is brought from outside the air stream. Series 16 unit is available in 36 to 60-in. diam delivering up to 40,000 cfm at static pressures up to 4 in. H₂O.

Bronze Rotary Pumps

ALL-BRONZE rotary pumps which can be used for pumping water, oils, salt solutions, chemicals, solvents and other liquids of

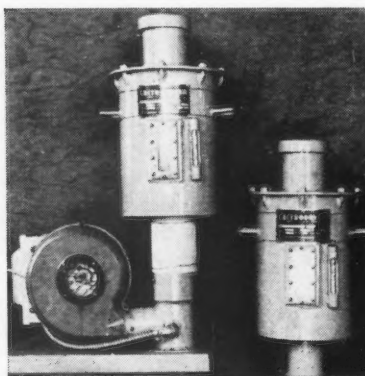


corrosive and noncorrosive materials have been announced by the *Power Plus Products Co.*, 2228 Bellevue, Detroit 7. They are produced in sizes of 6, 12 and 22 gpm at 40, 60 and 60 lb pressure, re-

spectively, all at 1750 rpm, with a maximum pressure of 150 psi. These pumps can be operated by a pulley or direct drive and are capable of lifting 28 ft. They are available as pumps only, pump and motor with flexible coupling, or as a complete portable pumping unit with motor, flexible coupling, pressure gage, switch and reservoir.

Tank Breathers

BREATHERS designed to preserve tanks and contents for industrial organizations employing storage tanks have been announced by the *Pittsburgh Lectordryer Corp.*, 502 32nd St., Pittsburgh 30. Known as Lectorbreathers, the devices can be mounted directly over a tank's vent or be piped to it. Incoming air is dried by its passage through activated aluminas contained in the breather. The air exhaled by the tank equipped with a Lectordryer is dry; it has a partial reactivating effect, thus making



possible long periods between reactivations of the breather. The breathers are equipped with a color indicator for determining when they are in need of reactivation and when reactivation is complete. Breathers are produced in several standardized sizes, although factors on size of tanks, nature of contents, weather conditions and how frequently and fast tanks are emptied should be considered before any specific size or type is installed.

Air Gun

DESIGNED to safeguard the operator from a blast of blinding particles when using an air gun to eject chips, filings, or oil from work in process, an air gun, called the Guardair, has been produced by *Algonquin Parts, Inc.*, 5000 Connecticut Ave., South Norwalk, Conn. An airguard, located above the nozzle of the air gun,

provides a safety umbrella of air. Particles ejected by the nozzle are instantly removed from the work by a feather-action thumb button. These minute particles are arrested by the invisible ring of air and



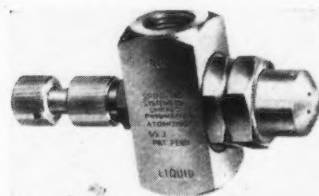
plummeted downward. Guardair is available with both standard nozzle as well as with extended tip for deep hole drilling operations. Standard and special thread sizes to fit any hose coupling are available.

Hydraulic Cylinders

NONROTATING hydraulic cylinders have been added to the line of air cylinders manufactured by the *Power Plus Products Co.*, 2228 Bellevue, Detroit 7. The new line includes sizes from 1½ to 8 in. in diam, any length stroke, pressures up to 3000 psi and seven standard mountings. Other features include pressure rings replacing tie rods; two-way action; cushioned cylinders who do not increase overall length, and ports from bottom or any side.

Atomizing Nozzles

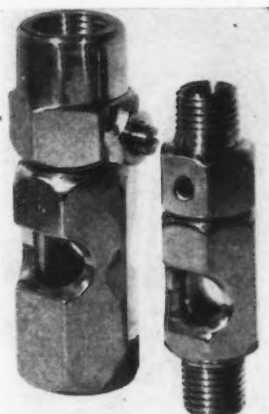
PNEUMATIC atomizing nozzles available for ½-in. pipe connections have been manufactured by the *Spraying Systems Co.*, 4021



West Lake St., Chicago 24, having capacities of 20, 40, or 60 gph. These nozzles of the internal mixing type are built to operate with compressed air, although other gases or steam can be used. Nozzles may be obtained in each size with or without a shut-off needle and are made of brass or stainless.

Sight Feed Valve

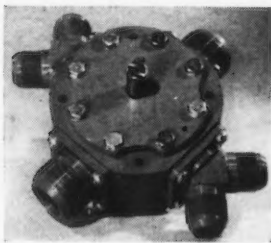
FOR oil circulating systems wherever the rate of oil flow must be visually checked and regulated, sight feed valves have been developed with a plastic sight by



the *Oil-Rite Corp.*, 3489 South 13th St., Milwaukee 7. They are adapted to circulating oil systems or multiple oiler arrangements for feeding a number of bearings from a central reservoir. In operation, oil flows past an adjustable port through a valve nozzle into the sight chamber where the amount of flow can be observed. The flow through the port can be adjusted within a wide range by a combination of a set screw and a hollow lock screw. It can be wide open, providing a steady flow of oil, or it can be closed entirely. Thus a slow drop feed is possible even with light oil. Valves are available with hexagon bodies of $\frac{3}{4}$, $1\frac{1}{16}$, $1\frac{1}{2}$ and $1\frac{5}{16}$ in. and male as well as female pipe threads of $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$ in.

Selector Valves

SAID to be capable of handling flows up to 2500 gph with negligible pressure drop, a series of industrial two-way, three-way and



four-way selector valves have been announced by *Hydro-Aire, Inc.*, 626 North Robertson Blvd., Los Angeles. Sizes range from $\frac{3}{8}$ to $1\frac{1}{2}$ in. The valves, which are lightweight,

have low operating torque and are said not to be affected by back pressures. They are suitable for use at temperatures ranging from -65° to $+200^{\circ}\text{F}$ and can be used for any type of liquid. Valves can be positioned at 200 psi and will withstand operating pressures of 1000 psi. The valve can be supplied in small sizes for use in compressed air lines.

Regulating Valves

A SINGLE-SEATED, internal pilot, piston operated reducing valve designed to be remotely adjusted from a conveniently located air loading panel, has been announced by *Leslie Co.*, 130 Delafield Ave., Lyndhurst, N. J. Known as Class LT-3, this reducing valve with a type ARP air loading panel is adaptable to process piping arrangements, particularly steam heating systems that require hazardous or inconvenient readjustments of inaccessibly located valves to meet changing conditions. A knob on the panel controls the loading pressure and reduced steam pressure. Furnished in bronze or cast steel body with flanged or screwed ends, these valves have interchangeable replacement parts, and stainless steel main valves as standard equipment. A line of single-seated, fully balanced diaphragm regulating valves for process industries and power plants is also manufactured by the company. These diaphragm valves are made with cast iron, bronze, and steel bodies for steam, air, or gas pressures up to 1000 psi, and are designed to be actuated by standard pressure or temperature instruments or controllers using 20 psi air or clean water. For temperatures over 450°F , steel diaphragm valves are equipped with a Condens-Seal cooling bonnet that offers a large radiating surface.

Tube Coupling

DEVELOPMENT of a fitting for use in joining all types of metal tubing, including $\frac{1}{4}$ hard stainless steel, in hydraulic and fluid-conveying systems has been announced by the *Parker Appliance Co.*, Cleveland 12. Eliminating the need for special flaring and assembly tools, brazing or soldering, the new fitting incorporates a steel ferrule which, when body and enclosing nut are tightened up, acts to cut a shoulder in the tubing itself,

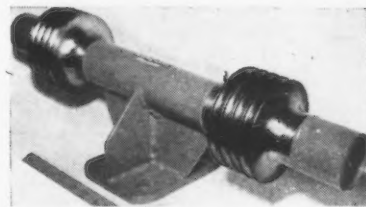
thus providing a strong, tight sealing grasp for the assembly. The fitting is said to be particularly useful in high-pressure applications and in installations where thick wall tubing is used. The three fitting units, illustrated, have been provided with a loose fit with the tube size to be used, promoting ease of assembly, and permitting the



tube to center itself during makeup to facilitate a uniform depth of cut. The only tube preparations necessary are square cutoff and removal of burrs. Joints on which the fitting is used may be broken at any time without affecting re-sealability. Fittings are available in $\frac{1}{4}$ to 1-in. OD tube sizes.

Offset Joints

PRODUCTION of a standard line of offset joints has been announced by *MagniLastic, Div. of Cook Electric Co.*, 2700 Southport, Chicago 14, to add to its series of packless expansion joint types suitable for all piping conditions. The units have been designed for joining pipe terminals that are out of line, or offset. They are constructed with an equal number of expansion flanges on either end of an insert section with length of unit and number of flanges determined by the misalignment condition to be corrected. Offset joints are supplied with bellows flanges from any of the standard expansion joint series which includes pressures from vacuum to 1000 psi, pipe sizes from $\frac{1}{2}$ to 24 in. and temperatures from -300 to $+1600^{\circ}\text{F}$. Joints of

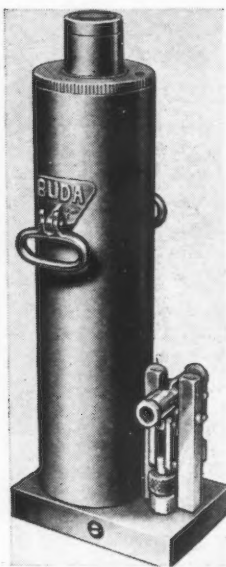


stainless steel, Monel, Inconel and copper cover all common corrosive conditions, it is said. End fittings are available in welding end or Van Stone bolted flanges. The company also manufactures a line of anchor joints, illustrated, which combine rigid anchoring of piping at accessible points, with allowance for

unequal thermal expansion and contraction on either side of the anchor point. This is accomplished by the number of flanges on either side of the anchor base to accommodate each condition encountered. Where several hydraulic surges within piping occur, anchor joints also minimize the transmission of shock to fittings and adjacent structures. They are made for standard pipe sizes from 1/2 to 24 in. and accommodate all pressures from vacuum to 1000 psi.

Hydraulic Jacks

FIFTY-TON hydraulic journal jacks have been added to the line of jacks produced by the *Buda Co.*, Harvey, Ill. The jacks have two speeds, a fast speed for quickly raising light or medium-heavy loads; normal or standard speed for raising capacity loads. The

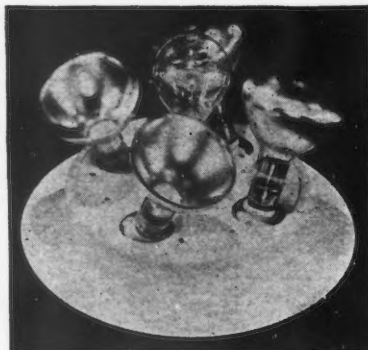


raising of loads is by pumping action and the lowering of loads is regulated by a control valve. Loads may be held indefinitely at any height. These 50-ton jacks are designed for high lifting jobs in railroad repair shops, for bridge work and for heavy general industrial lifting. Model 50-B-12 has a height closed of 12 in., a rise of 7 in. and weight of 120 lb; Model 50-B-26 has a height closed of 26 in., a rise of 20 in. and weight of 200 lb.

Infra-Red Heater

KNOWN as a Heatolier, a circular fixture using incandescent or fluorescent lamps, has been designed by the *Miskella Infra-Red Co.*, E. 73rd and Grand Ave., Cleveland 4, for providing local heat or

for infra-red baking. The white enamel body of the fixture is flared out to serve as a reflector for the lamps. Model A has a two lamp heat circuit, with two 250 w lamps producing 500 w in heat. However,



a double action switch can throw the lamps in series producing only 250 w in heat. Model B holds four lamps. Heat can be angularly diverted in north and south direction in Model A and in all four directions in Model B. The Heatolier is made in floor and ceiling types.

Electronic Wire Recorder

TO CALL attention to safety precautions in factories, warehouses, stores, for talking bulletin boards in factories, public places, and at convention exhibits, an electronic wire recorder has been produced by *Sound Media*, 17 East 48th St., New York. It is a plug-in appliance that operates on any current without converting accessories and has sound-level control to compensate for noises. Its photoelectric switch, which actuates the wire recorder, can be located to suit local conditions, in the floor, wall, or ceiling. Also, under the name of Sound Salesman, the device can be used for advertising purposes in stores. It provides single or multiple messages, with rest periods on repeat messages, and can operate in any position, at any angle.

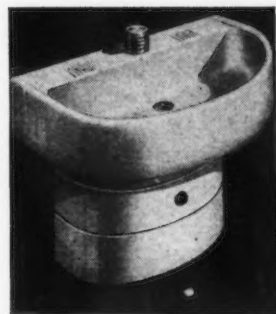
Filing Cabinets

FILING cabinets with or without general locks, in suspension and nonsuspension types, are being marketed by *Lyon Metal Products, Inc.*, Aurora, Ill. The cabinets feature rounded corners on easy rolling drawers. Double stops prevent drawers from being pulled out and dropped accidentally. They stay closed due to 3/8-in. pitch to rear and there is said to be no rebound when drawers are closed hard. Suspension

type cabinets include regular height with three letter drawers and two card drawers, and counter and desk height models. In the legal size, two, three and four-drawer files 17 1/2 in. wide are available. Nonsuspension type are available in two and four-drawer files in letter and legal sizes.

Washfountain

EQUIPPED with sprayhead instead of faucets, a washfountain, called the DUO Model, has been produced by the *Bradley Washfountain Co.*, N. 22nd and W. Michigan St., Milwaukee 1, for general use in plants, offices, engineering departments, etc. The sprayhead enables two persons to be served at the same time. Besides reducing the number of piping connections, this fixture has the added sanitary feature that hands touch nothing but clean running water. A foot treadle controls the spray and the self-flushing deep bowl prevents



collection of contaminated water. The bowl is furnished either in stainless steel or white enamel iron with similarly finished pedestal panel that encloses the connections and mixer.

Water Coolers

EQUIPPED with a chrome-plated bubbler valve having fingertip operation, electric water coolers have been announced by the *Ebco Mfg. Co.*, Columbus 8. Model K-10 has a rated hourly capacity of 10 gal, said to serve 100 persons an hour. The cabinet, which is made of rust resistant steel, houses the cooling unit consisting of an adjustable thermostatic switch to maintain drinking water at constant temperature, and a nonclogging counterflow precooling unit. The cooler is 15 1/4 in. wide x 15 1/2 in. deep x 43 1/2 in. high. Electrical requirements are 110 v, 50 or 60 cycle, single phase, ac.

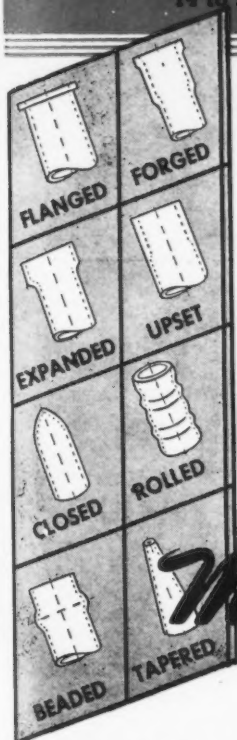
**UNIFORMITY
OF STRENGTH
AND THICKNESS
ACCOUNT FOR ITS
WORKABILITY**

Michigan STEEL WELDED TUBING

**ALSO
SQUARE • RECTANGULAR**

Minimum dimension $\frac{1}{8}$ "
Maximum dimension $2\frac{1}{4}$ "
14 to 20 gauge.

$\frac{1}{4}$ " to 4" O.D.
9 to 22 gauge



The "Production Parts Tubing"

Because it re-forms and machines so well, Michigan welded steel tubing is widely used in the fabrication of production parts such as automobile exhaust and muffler tail pipes, gas tank filler tubes, steering jackets,

and wherever bent and shaped tubes may be required. True concentricity, uniform I. D. and O. D. make it particularly economical when long runs are involved.

Prefabricated Parts or Tubing

Michigan will furnish the complete part fabricated from welded steel tubing, all re-formed and machined. If you have the equipment and capacity in your own plant to do this work,

consider Michigan as your source for tubing in the sizes listed above—commercial mill lengths or cut to special lengths.

Engineering advice and technical help in the selection of tubing best suited to your needs.

Michigan STEEL TUBE PRODUCTS CO.

More Than 25 Years in the Business

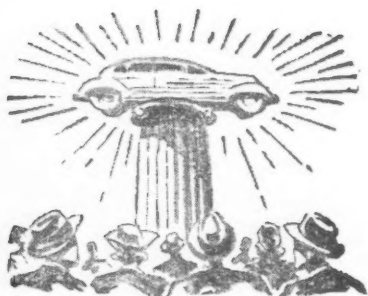
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Assembly Line

WALTER G. PATTON

• Detroit prepared to continue motor car output . . . GM cancels its 1948 die program . . . Ternstedt plant opened at Columbus, Ohio.



DETROIT—With the freight embargo lifted and the threat of a coal stoppage abated for the present the automobile industry prepared to attempt full-scale production this week provided the necessary parts and materials could be found. In most categories the factory float was sufficient to permit operations to go forward; in a few classifications, however, where the industry operates direct from freight cars there was some doubt that enough materials would be available immediately to permit large-scale production. In a few cases full production may have to wait until the normal flow of materials is resumed.

The only extensive layoffs in assembly plants during the past week were 20,000 men at Ford's Rouge plant; these men were notified by telegram to report for work on Monday of this week. Presumably sufficient materials are in sight at the Rouge to keep going or this action would hardly have been taken.

Had the embargo been continued for a few more days freight movements in his area would have been badly snarled and half a million men would have been added to the rolls of the Michigan Unemployment Compensation Commission. At the present time this fund is said to be sufficient to meet all "expected" contingencies but the effect of a prolonged coal tie-up could hardly be classified as an anticipated event.

The effect of such a strike would have been catastrophic so far as the state fund is concerned, a spokesman for the commission said. In view of the present industrial crisis it is difficult to recall that only a little more than a year ago automobile producers were eagerly looking forward to expanding their plants at a cost of hundreds of millions of dollars. It had been anticipated that the industry would soon be able to introduce its new postwar "dream" cars and that at least 5 million cars and trucks would be built during each of the next 3yr. The automobile producers envisioned employing more people than ever before and paying them better wages. The industry also thought it would be earning a good profit on its operations—at least, it felt it should be permitted to do so. It dreamed of vast new research facilities and better labor relations.

As everyone knows, all of this is now greatly changed. The carefully planned industrial expansion programs have evaporated under a blanket of CPA regulations and material shortages. New and important automobile research projects have been indefinitely postponed. The 1948 model cars are rapidly being pushed back to 1949.

THE final blow came this week when General Motors canceled its die work for 1948 models.

Instead of producing 5 million or more motor cars for several successive years, the industry has recently seem its hopes for a 3 million car year practically obliterated. It has now almost abandoned hope for operating at a profit in 1946 despite a 50 pct increase in the price of cars as compared with 1941 and huge tax credits.

In only one respect has the motor car industry lived up to expectations in the postwar period. Up to now it has been employing more people and paying higher wage rates than ever before in its peacetime history.

Maybe C. E. Wilson, president of General Motors, was being more realistic than pessimistic when he said recently that he did not expect a Chevrolet to sell for less than \$1000 again in his lifetime.

By canceling orders for dies

for its 1948 models GM again emphasized the fact that the automobile industry's biggest job is to build more cars and sell them at a profit. A corollary to this rule is, of course, that you change models only when you have to. As long as present models can be sold it is more profitable to continue existing models than gamble on a new product.

In explaining the die cancellation GM said that unsettled labor conditions and uncertainty surrounding the economic picture figured prominently in the decision.

Whether GM had specifically in mind the present wage demands on Chrysler, the 150 pct rise in the cost of tooling or the Detroit patternmakers recent demands for \$2.75 per hr minimum (THE IRON AGE, Dec. 5, p. 92) is not certain but it can be assumed that these things were considered in determining the new GM policy.

EMBODYING the latest innovations in modern factory architecture and planning the first of General Motors postwar plants is now in production at Columbus, Ohio. Although not completed the new Fisher Body-Ternstedt Division plant stretching the equivalent of two city blocks is employing 600 workers. Additional employees will be added as rapidly as conditions warrant, according to James L. Conlon, resident manager.

The new plant layout stresses the necessity in factory operations for efficient working area layout, facility of entrance and exit, good lighting, convenience of workers and improvement in general working conditions.

There are two principal levels in the Columbus plant. All manufacturing is confined to the upper level while service facilities, including locker and wash rooms, cafeteria, etc., are concentrated on the lower level.

More than 4000 tons of steel went into the new Columbus plant which has a total roof area of 17 acres including the administration building, power house and auxiliary structures.

Although the building is not yet completed, enough machinery has been installed to permit the produc-

5 WAYS

MAN-AU-TROL INCREASES VERTICAL TURRET LATHE PRODUCTION

Without losing any of its versatility of manual operation, the Bullard MAN-AU-TROL Vertical Turret Lathe . . . in automatic operation . . . steps up output for 5 reasons.

1. It is cutting almost continuously . . . no stops for measuring the piece or changing feeds and speeds.

2. It is set up for maximum productivity . . . assuring continuous operation at maximum practical feeds and speeds.

3. The machine eliminates the elements of fatigue and human error.

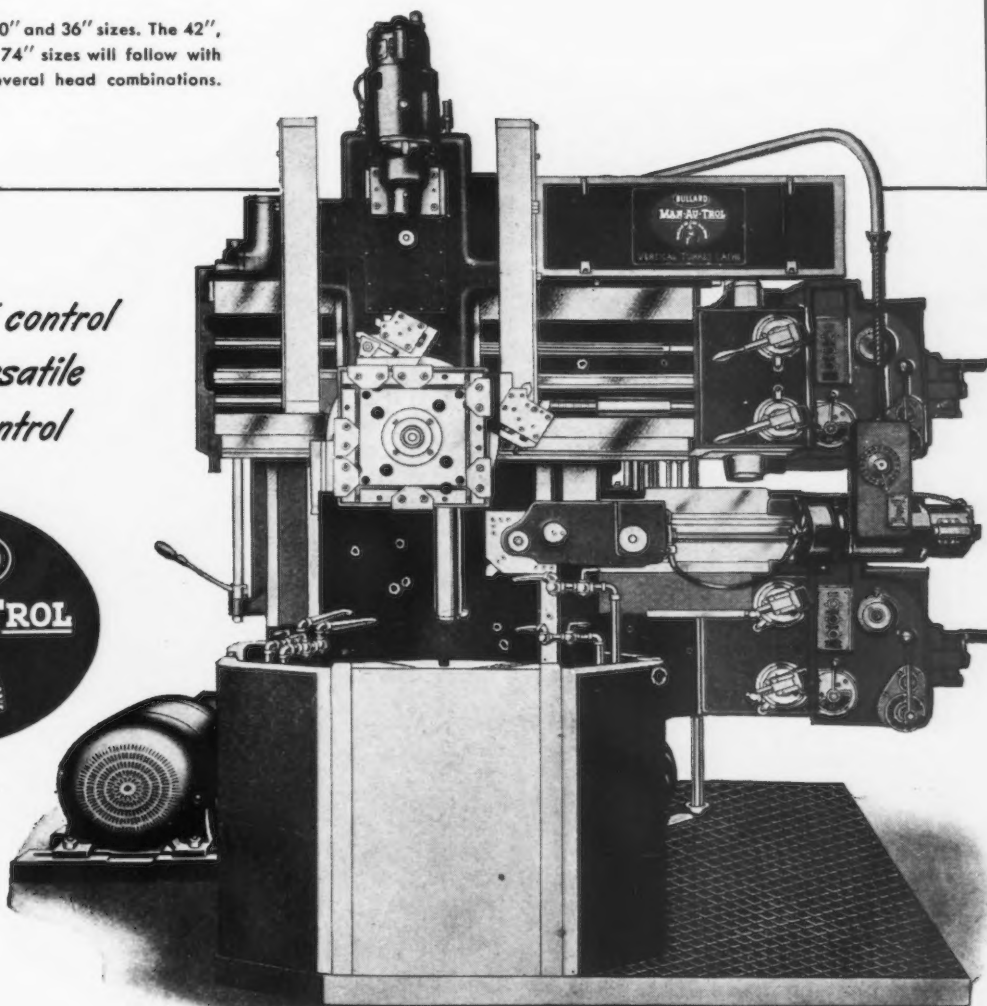
4. Its turret head permits standard simplified multiple tooling for simultaneous cutting not possible with other types of Vertical Turret Lathes.

5. It consistently works to a degree of accuracy not obtainable with manually-operated machines . . . work spoilage practically eliminated.

For full details about the unique productivity, flexibility and accuracy of Bullard MAN-AU-TROL Vertical Turret Lathes, write for your free copy of Bulletin MAV-G-1 today. The Bullard Company, Bridgeport 2, Connecticut.

Now made in 30" and 36" sizes. The 42", 54", 64" and 74" sizes will follow with selection of several head combinations.

*The automatic control
that is as versatile
as manual control*



BULLARD CREATES NEW METHODS TO MAKE MACHINES DO MORE

THE IRON AGE, December 12, 1946—87

tion of hardware and fittings for all types of General Motors' cars. Among the items produced by this division are door moldings, door hinges, deck lid supports, window regulators, door locks, shroud ventilators and operating mechanisms.

To provide a maximum amount of light for plant workers a total of 89,000 window lights have been installed in the building. The special greenish blue window glass used is reported to have remarkably uniform natural light intensity and has the additional property of holding back infra-red light rays. Thus the factory area, despite its 89,000 window lights, will be relatively cool even on hot summer days.

Artificial light is provided by fluorescent tubes having a combined capacity 1,500,000 kwh—enough to supply the lighting requirements for more than 7000 homes. Power facilities located at the plant are rated at 7500 kva.

A UNIQUE feature of the Columbus plant is the system of lower level passages which provide easy escape in an emergency directly to the outside from any part of the factory building. Exits open to the east, the south and the west are reached by wide stairways from five different locations in the factory area.

More than an acre of space has been reserved for toilet, locker and washroom facilities. With five wide stairways leading to the manufacturing area, there is easy and efficient movement to and from the operating floor instead of the usual crowded, haphazard traffic.

Hospital facilities designed to take care of virtually any kind of injury occupy 5000 sq ft. Infra-red and ultraviolet equipment is available and there is a complete operating room, laboratory facilities, sterilizing and X-ray equipment. A special room has been provided for the treatment of fractures and for ear, nose and throat ailments.

The fire protection system includes a modern fire alarm central recording system with automatic sprinklers, conveniently placed hand fire extinguishers and an auxiliary 400,000 gal water storage tank designed to go into service when even a small drop in water pressure occurs.

A cafeteria which will serve 1700 persons at one sitting has been provided with the latest types of food

processing equipment, refrigeration and food storage. All the usual facilities are built of stainless steel.

Three railroad spurs serve the new Fisher - Ternstedt plant. Freight cars bring stock into one end of the plant. After the stock has gone through the various processing departments it arrives at the other end as a finished product ready for shipment.

It was originally planned to have the Columbus plant in operation by last midsummer but due to strikes and shortages of raw materials it has been necessary to set back the original program. However, as rapidly as a portion of the building

is completed the company moves in and starts to install production machinery. Some of the present installations are necessarily on a temporary basis but permanent equipment will be installed as rapidly as it becomes available.

Parts will be shipped from Columbus to the various Fisher Body assembly plants in Atlanta, Baltimore, Flint, Janesville, Wis., Kansas City, Lansing, Norwood, Ohio, Oakland, Calif., Pontiac, St. Louis, and Tarrytown, N. Y. The new Ternstedt plant at Columbus is one of three such units, the others being located at Detroit and Trenton, N. J.

Includes Program Of Social Insurance To Demands of UAW-CIO

Detroit

• • • An employer-financed social insurance program to give workers comprehensive protection in event of sickness, disability and death is being included in the UAW-CIO demands on all employers whose contracts can be reopened according to a recent announcement by Walter P. Reuther, UAW-CIO president and chairman of the union's social security committee. This policy was adopted by the international executive board in its meeting at Cleveland on Oct. 20, Reuther said.

The union's social security committee is also formulating details of an old-age pension plan to supplement present provisions of the Federal Social Security Act.

The present union social insurance program calls for an employer contribution amounting to 3 pct of the gross earnings of employees to provide benefits in the event of sickness or accident amounting to not less than 50 pct of average earnings for a maximum of 52 weeks in the case of one disability. In addition, the program calls for hospital, surgical, medical and maternity benefits designed to cover the worker in the case of emergencies which arise due to ill health. Also specified in Reuther's letter are death or survivors' benefits and benefits in the case of total and permanent disability in an amount which will yield as a minimum the equivalent of one year's average

annual earnings of the worker.

Both the social insurance and the retirement program call for bargaining by locals under the guidance of the society security committee of the international union. The committee has directed that no local shall conclude an agreement in either of these fields until it has been submitted to the International Social Security Committee for approval.

K-F to Grant Discount On Cars to Employees

Detroit

• • • Kaiser - Frazer has announced that 100 new cars have been earmarked for sale to employees at a 10 pct discount. In a drawing recently conducted by the employee car purchase department, 150 names were publicly drawn from a barrel containing 533 verified application cards and entered on a priority list. At a later drawing the remaining names were selected and placed on the list.

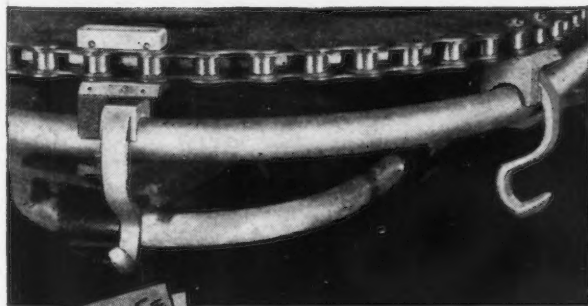
These applications will be filled in the order they appear on the list from an aggregate of 5 pct of each day's production which has been set aside for employee purchase starting with car number 5001. No time limitation is placed on the plan and employees who cannot handle the purchase at the present time can retain their application for future use.

Purchasers of Kaiser-Frazer cars under this plan must purchase cars for their own and their family's use only, and the privilege cannot be used again for 1 yr.

MECHANIZE YOUR PLATING ROOM AND SAVE MONEY

The Udylite Semiautomatic Plating Machine with one operator who merely loads and unloads the racks will turn out as much work in a given time as a battery of still tanks with a number of operators. And it doesn't require a skilled operator either.

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REPRESENTATIVES IN ALL PRINCIPAL CITIES

• **GOP pledge to slash taxes excites hope that it can be fulfilled . . . Administration to cut costs but may go no further.**



WASHINGTON—As the time for convening the new Congress nears, more and more attention is being turned toward the nation's budgetary matters. The Administration has come out for reduction in governmental expenditures but is lukewarm, if not actually cold, toward any proposals for reduction in taxes at the present time. On the other hand, the GOP, now in legislative power after 14 yr, has expressed its intention of reducing both federal spending and taxes.

It is currently reported that President Truman plans to hand to Congress a budget estimate asking \$37 billion for the fiscal year 1947-48. This would represent a \$4 billion reduction over the current rate of expenditure and about \$3 billion less than the receipts anticipated by the White House. The \$3 billion excess would be applied to reducing the national debt.

In view of statements by Republican leaders, any budget which calls for the government spending more than \$30 billion next year may be expected to meet with vigorous opposition. Especially is this true in the House where the Appropriations Committee is slated to be headed by

Rep. John Taber of New York. Outspoken Mr. Taber has some very definite ideas about affecting governmental economy.

TO begin with, Mr. Taber believes that next year's budget can be reduced by \$12 billion without crippling essential governmental activities. In fact, he believes that the government should be able to get along on no more than \$27 billion. However, because there are always unexpected expenses cropping up, he is willing to throw in another \$2 billion to allow for good measure which would bring his estimate up to a total of \$29 billion as compared with the present rate of \$41 billion.

Army and Navy would get the biggest single slash. Mr. Taber would reduce their funds to around \$8 billion as against the \$13 billion estimated for the military forces this year. He believes the reduction would not curtail any essential functions, pointing out that by next year occupation costs should be considerably less, that both Army and Navy should be down to planned peacetime strength as to both military and civilian personnel, and that by cutting corners there are countless little ways of saving which, while insignificant in themselves, should add up to a considerable total.

Another means of governmental savings, he contends, is by slashing governmental employment: Mr. Taber has set this reduction in force at an arbitrary figure of 1 million. There are varying opinions as to whether this can be accomplished. It would seem to depend to a great extent on whether Mr. Taber meant a reduction of a million from the present 2.2 million federal workers or the 1.6 million to which the rolls are supposed to be reduced by June 30. The prewar federal payroll was slightly less than a million.

IT is evident in any event that the New Yorker is determined to effect a decided reduction in force. Along with many others, he feels that the so-called "emergency agencies" should be liqui-

dated as rapidly as possible and he sees no reason why the permanent or "old line" departments should continue to grow by leaps and bounds. For instance, though most officials are chary of mentioning the Veterans Administration lest their statements be misinterpreted as not being sympathetic to veteran affairs, Mr. Taber bluntly says he sees no need for much, if any, more increase in the 200,000 presently employed by that agency. He feels that better utilization of present personnel ought to do the trick, and that application of the same yardstick should tend to actually reduce others.

The New York legislator also has an interesting theory in regard to taxes and federal income. At the risk of being called a tory, a reactionary, or something similar, he firmly contends that reduction in taxes does not necessarily mean a falling off in government income. Instead, it is his belief that tax reduction would work in a beneficial circle—that the less taxes there are, the more income to spend; the more income to spend, the more production demand; the more production, the more workers and more income to tax.

In this, Mr. Taber seems to have adopted the principle laid down by former Secretary of the Treasury Andy Mellon, who believed—and proved—that the way to reduce the national debt was by not more but less taxes.

STRIKERS lost 102,525,000 man days during the January-October, 1946, period, according to the Bureau of Labor Statistics, Dept. of Labor. There were 4025 work stoppages, involving 290,000 workers in the loss of 4,500,000 man days. These figures do not measure the indirect or secondary effects in non-struck establishments or industries whose employees were made idle as the result of material or service shortages. By reason of the coal and other strikes that developed or were continued in November, time lost directly by strikes in the first 11 months of 1946 aggregated millions of additional man days.

HOW TO BROACH

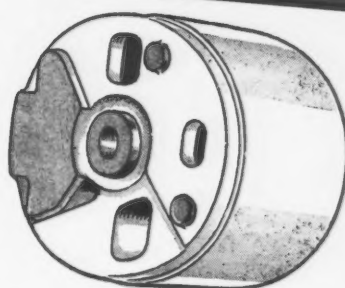
*Totally
unlike parts*

on one Duplex Machine

CINCINNATI

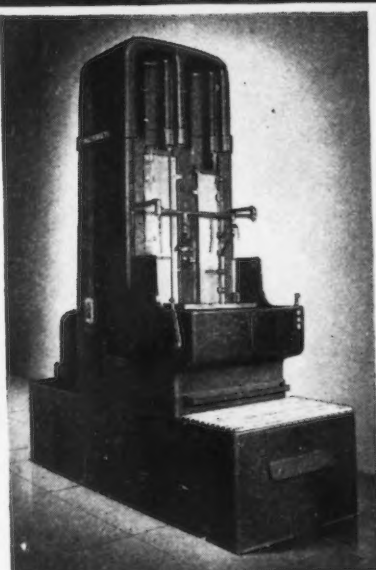


Part name—Compressor Cylinder
Material—Cast Iron
Operation—Broach Tongue and Bottom
Stock removal— $1/16"$ – $3/32"$
Production—144 per hour



Part name—Compressor Motor Housing
Material—Cast Iron
Operation—Broach Hub, Pad, and Two Bosses
Stock removal— $3/16"$ – $1/4"$
Production—144 per hour

Broached surfaces shown in color.



CINCINNATI No. 10-54 Duplex Vertical Hydro-Broach. Engineering specifications on the 3-, 5-, and 10-ton sizes may be obtained by writing for catalog M-1387-1.

● It's easy to see the advantages of broaching when the parts are produced continuously or in exceptionally large quantities. But, it's not so evident when the parts are totally unlike and produced in small quantities or at a comparatively slow rate of production. The equipment shown here illustrates how this can be accomplished at a low cost per piece. ¶ The equipment comprises only one machine—a CINCINNATI No. 5-54 Vertical Duplex Hydro-Broach—tooled up by Cincinnati Application Engineers to broach three parts, one of which is *totally unlike* the other two. Two fixtures and two broach holder assemblies are supplied for the left-hand side to broach two similar cylinders, while the right-hand side is tooled up to broach the housings. In this manner, one man, on one machine, broaches housings alone, either one two cylinders alone, or housings and cylinders together. ¶ Perhaps many parts in your own shop, even though they are totally unlike, could be machined more economically by the broaching method. Our engineers would like to talk broaching with you. Send blue prints of the parts with complete production and cost requirements.

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CUTTER SHARPENING MACHINES

BLS Report On Labor-Management Disputes

	Work Stoppages Beginning in the Period		Man-days Idle (All Stoppages)
	Number	Workers Involved	Percent of Estimated Working Time (All Industries)
January-October:			
1946*	4,025	4,095,000	102,525,000
1945	4,258	2,996,400	23,372,000
1944	4,347	1,822,400	7,547,000
1935-39 average	2,551	1,041,000	14,859,000

*Preliminary estimates.

Repercussions of these strikes, particularly the coal strike, caused a heavy loss of man-hours in the many industries, including steel, whose operations are dependent upon coal.

For whatever it is worth, wages lost during the postwar period are estimated at about \$2,500,000,000, divided almost evenly between strikers and nonstrikers made idle by labor disputes. Calculations of wage gains by strikes ran up to around \$150,000,000, which, of course, is increased each day of work.

The BLS score on Labor-management disputes is shown in the accompanying table.

Creates Army Board To Study Measures For U. S. Civilian Defense

Washington

• • • Bolstering the work of the Army-Navy Munitions Board in preparing for industrial mobilization and its defense in time of emergency, the War Dept. has disclosed the creation of an Army board to plan for "civil defense for the United States insofar as it pertains to War Dept. participation in this part of national defense planning."

Heading the new board is Maj. Gen. Harold R. Bull who was Gen-

eral Eisenhower's chief of operations for the European theater. Assisting him will be Maj. Gens. Percy W. Clarkson, Robert W. Douglas, William H. Arnold, and Brig. Gen. Blackshear M. Bryan, the Provost Marshal General.

It is understood that the studies of the Army Board are directed not only toward defense measures against the atom bomb but any other methods of mass destruction which have been developed or are now under study.

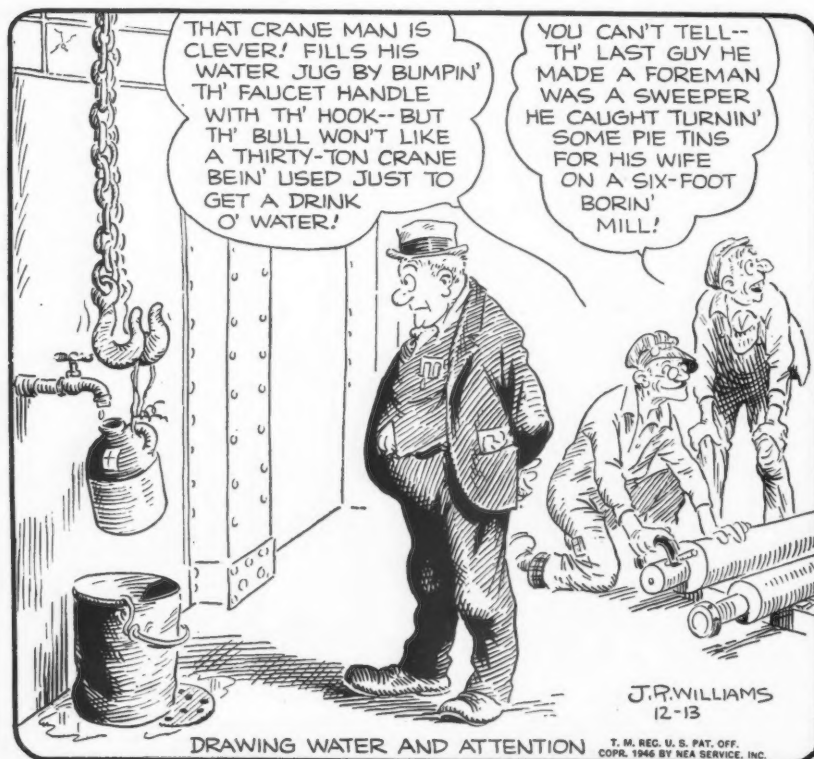
While the new Army group is not working under the instructions of the Army-Navy Munitions Board, as part of the latter's study for defense mobilization, it is presumed that the Army's project is well known to and at least has the tacit approval of the ANMB.

Obviously, a national plan for atomic defense of the nation and its industry which would probably involve shifts of population and dispersal of industry, perhaps underground, is not a military responsibility. Nevertheless, the armed forces are in a good position to advise and recommend steps to be taken or adapted for the protection of the civilian population and industry.

A Navy group is engaged in a similar enterprise under the supervision of Rear Adm. William S. Parsons who is acting as the Navy's chief for "atomic defense." It is centering its study on protection of shipping and shore installations.

THE BULL OF THE WOODS

BY J. R. WILLIAMS



Revision of Policies To Include Advances Made in War Sought

Washington

• • • Revamping of government procurement policies and practices incorporating the improved methods and procedures learned during the war which are adaptable to peacetime usage, will again be sought in legislation (see THE IRON AGE, Feb. 14, 1946, p. 120) to be introduced into the new Congress.

Most of the revised policies which the agencies, particularly the armed forces, would like to retain are authorized by statutes and executive orders which expire with the official termination of the war or soon after.

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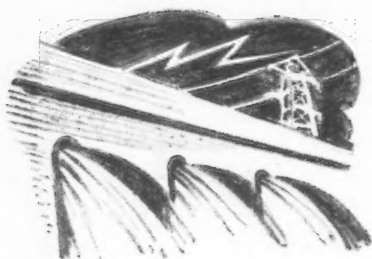


IN 70 CITIES
Coast To Coast

West Coast . . .

ROBERT T. REINHARDT

• Rail embargo and brief general strike in San Francisco East Bay area was major worry of industry . . . High construction rate offers antidote.



SAN FRANCISCO—Briefly happy over the conclusion of the 54-day maritime tie-up late last month with a subsequent upsurge in general business activity, San Francisco Bay Area industrialists again relaxed as the coal strike was called off.

Shutdown of the coal mines affected this area to a less extent than other parts of the country because of heavy reliance on hydroelectric power and oil for fuel, but it was acknowledged that because of the scrap shortage steel producers here would have been harder hit than before.

Dependent on rail shipments for many of the already hard-to-get components supplied by eastern manufacturers, many industries faced shutdowns in periods varying from a week to a month. The auto assembly plants of Ford in nearby Richmond and of General Motors (Chevrolet) in Oakland had anticipated shutting down completely in 10 days or two weeks if the embargo continued.

Bethlehem Pacific Coast Steel Corp. reports that production was not seriously affected by the embargo, but the scrap and pig shortages are still plaguing this producer.

Columbia Steel Co.'s production at Pittsburg, Calif., was not seriously affected by the embargo or coal strike, and the ingot rate has

been holding steady in the 90 pct of capacity range. A real headache faces this producer in the form of a suit by approximately 2300 workers seeking "portal-to-portal" pay.

Truck companies and the air lines were heavily booked by local manufacturers seeking to keep raw or semifinished materials moving in and finished products hauled east. Intrastate shipping was but little affected since practically all rail engines in use burn oil.

In general there was as much concern locally about the inability of western manufacturers to make deliveries to the east as over the restrictions on deliveries to the Coast. One sheet metal user, probably more bitter than the rest, said: "So far as the steel I've been getting is concerned, it could be sent by air without breaking me up in business."

Although short-lived, the general strike in Alameda County developed all the usual drama, violence and financial loss usually accompanying such fiascoes. The general walkout of machinists, building trades craftsmen, cooks, butchers, bakers and candlestick makers came about because Oakland and Berkeley, Calif., police provided protection for truckloads of merchandise being delivered to two stores involved in a dispute with the AFL over the manner in which negotiations should be carried out.

Approximately one million persons were at least seriously inconvenienced, an estimated \$1 million was lost in wages alone each day according to United Employers, Inc., and more than \$6 million was the total cost to retail business and transportation. No one would attempt to estimate the loss to industries although it was conceded it ran into the millions.

Workers returned to their jobs when the strike was called off by the Alameda Labor Council on assurance that police would not be used again as "scab-herders" according to AFL spokesmen. At best the settlement was not effected on a clean-cut basis, with a few red faces on both sides of the battle and with both stores which sparked the flare-up closed.

On the brighter side of the industrial picture was the announcement that this area continues to hold a top position in the approvals by CPA for non-resi-

dential construction. One of the major jobs authorized for the week ending Nov. 28 was the plant to be built by the H. C. Little Burner Co. of San Rafael for the manufacture of floor furnaces.

Total construction approved for that period in the San Francisco area amounted to \$1,460,573 with \$911,070 denied.

Approvals for the week in the entire ninth region including northern California, Oregon, Washington, Montana, Idaho, Wyoming and Hawaii totaled \$2,425,040 with \$1,328,820 denied.

American Radiator & Standard Sanitary Corp. of Pittsburgh was given approval last week for construction of a \$950,000 building at Richmond, Calif., for the production of brass plumbing fixtures which is scheduled to employ approximately 1000. Authorization was also given this company for construction of a pottery works at Torrance, Calif. Total investment in these two projects will be approximately \$6 million according to Howard I. Detro, manager of the company's plant at Richmond, Calif., where it produces bathtubs, sinks and similar home fixtures.

Resignation of Wilson W. Wyatt as housing expediter was not mourned by the Associated Home Builders of this city. Milton Morris, speaking for the association, was reported as stating:

"Mr. Wyatt didn't have the right approach to the housing crisis when he spent so much federal time and money on prefabrications and houses built under startling new conditions." He went on to say that he believed Mr. Wyatt's resignation would end the spending of "millions of dollars in experiments."

The local NHA offices expressed just the opposite views, to the effect that Mr. Wyatt's resignation was a serious setback to the veteran's housing program.

PORTLAND — After acquiring heroic war records, six escort aircraft carriers are coming into home waters to be cut up into scrap and their steel channeled into more prosaic pursuits.

Built at Henry J. Kaiser's shipyards at Vancouver, Wash., just across the Columbia River, during 1943 and 1944, the six carriers will be scrapped by the Zidell Machinery

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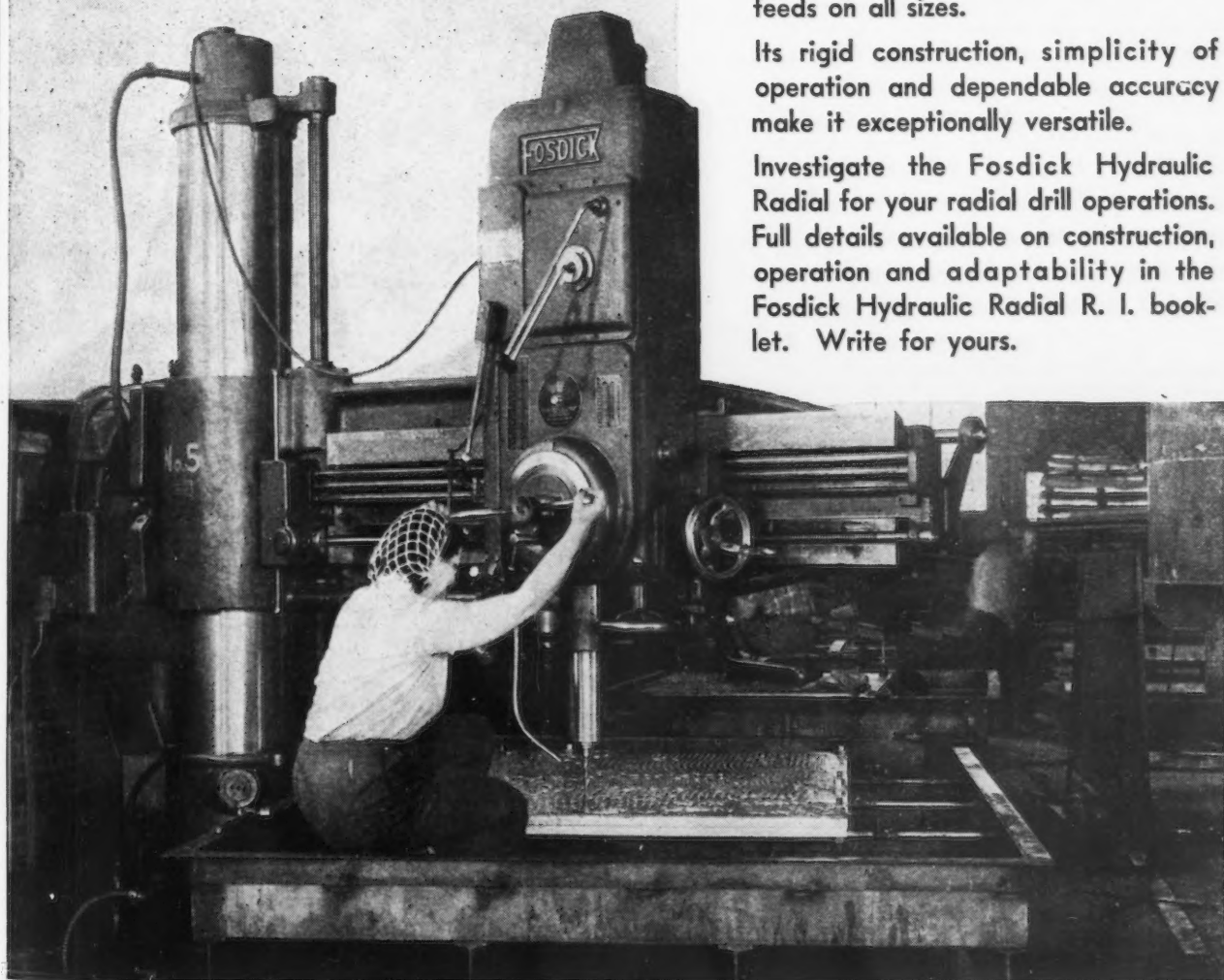
Complete hydraulic control with all controls centralized in the head, the operator can drill more holes faster with a Fosdick Hydraulic Radial.

Rapid traverse to head, column clamp and interlocking lever for unclamping, raising and lowering arm are all hydraulically controlled. This insures positive operation and provides exceptional ease of operation.

The machine offers a selection of thirty-six spindle speeds and eighteen feeds on all sizes.

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Investigate the Fosdick Hydraulic Radial for your radial drill operations. Full details available on construction, operation and adaptability in the Fosdick Hydraulic Radial R. I. booklet. Write for yours.



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MACHINE TOOL COMPANY

CINCINNATI 23... OHIO

& Supply Co. within the next few months at some local yard as yet unnamed. Two PC's, or sub-chasers, will also be cut up by the same company.

This operation will set into motion locally the program of the CPA to encourage salvage and scrapping to provide scrap for western steel production. Contracts for the work and sale of the ships were awarded by the Redistribution & Disposal Administration of the Navy. Purchase price of the six carriers was reported as "in excess of \$100,000" and of the sub-

rated production capacity of 41,500,000 lb of ingots per year, which, when added to the 216 million lb of ingots which can be produced at the Mead reduction plant near Spokane, will go a long way toward providing the ingot tonnage which can be rolled in the Trentwood plant, also near Spokane.

The Tacoma plant has had the reputation of being a high-cost producer and there is some question about the availability of sufficient power to permit full capacity operation, but since these facts

plants at Port Chester, N. Y., Coraopolis, Pa., and Rock Falls, Ill. Rated as a \$12 million concern, it has been in business 101 yr.

Local operations will be under R. A. MacDonald, plant manager, and Charles P. Brenner, Pacific Coast sales manager. An additional 56,000 sq ft of adjoining property has been purchased for future expansion.

Two California Plants Used for Welding Rod Output Up for Sale

Washington

• • • WAA is offering for sale or lease two California war plants, one near Pittsburg and the other in Stockton, which were used for the production of coated welding electrodes for the Navy. Both plants, WAA said, can be continued in welding rod production or can be converted for light manufacturing purposes, such as molded plastics, ceramics or machine shops.

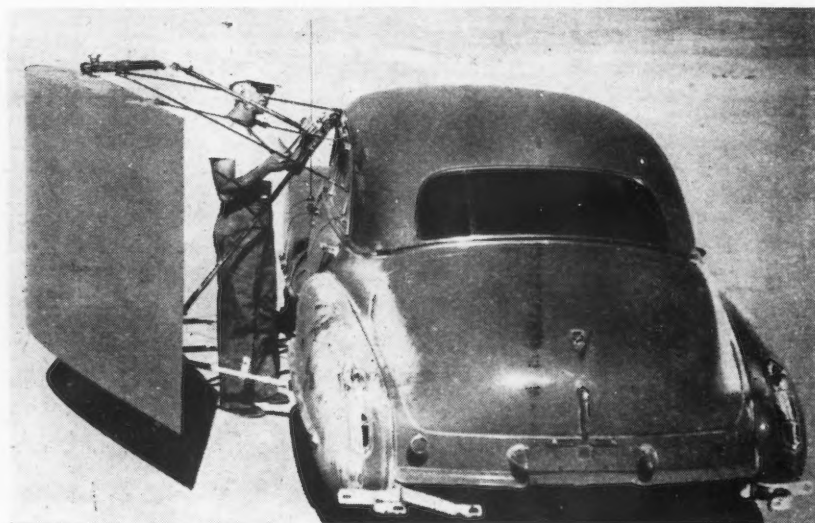
The plant near Pittsburg, which cost the government \$837,000 was operated by Arcrods, Inc., and was designed to produce 4,000,000 lb of welding rods monthly. It is said to be in excellent condition.

The Stockton plant, formerly operated by the National Cylinder Gas Co., was designed to produce 1,750,000 lb of welding rods monthly and represents a reported cost of \$170,000 to the government.

Written proposals must be received at the WAA Regional Office, 1182 Market St., San Francisco, before 10 a.m., Jan. 7, for the facilities at Stockton, and before 10 a.m., Jan. 31, for the facilities near Pittsburg, at which times they will be publicly opened and read.

Also being offered for sale is a plant in Battle Creek, Mich., which was formerly operated by the Eaton Mfg. Co., for the production of aircraft engine parts and sodium filled valves for aircraft, marine and tank engines. Inspection may be arranged with the WAA Detroit office, which is authorized to discuss credit terms. Preferential treatment, WAA said, is given to small businesses.

A government-owned machinery and machine tool manufacturing facility adjoining a plant owned by the Cross Co., Detroit, has been sold to that company for \$175,000.



FLYING LOW: U. S. Rubber Co.'s tire engineers have found that test cars equipped with an aeroplane wing section on one side can travel safely around circular tracks at high speed. The wing counterbalances centrifugal force on the curves, eliminates side scrubbing of tires and creates test conditions more like normal highway driving. High speeds not considered safe for testing on public roads can thus be attained on a circular track.

chasers as \$1500. One of the latter had been built locally by the Commercial Iron Works.

The carriers are rated as having a gross tonnage each of 7000 and the sub-chasers as 400 tons each. It is estimated that approximately 17,000 tons of scrap will be developed from the total operation.

This once scrap-rich area will welcome this tonnage as local furnaces have been operated on a hand-to-mouth basis for some time.

SEATTLE—Purchase of the aluminum reduction plant at Tacoma, Wash., by the Permanente Metals Corp. from the WAA for \$3 million gives that company a needed additional source of aluminum ingots.

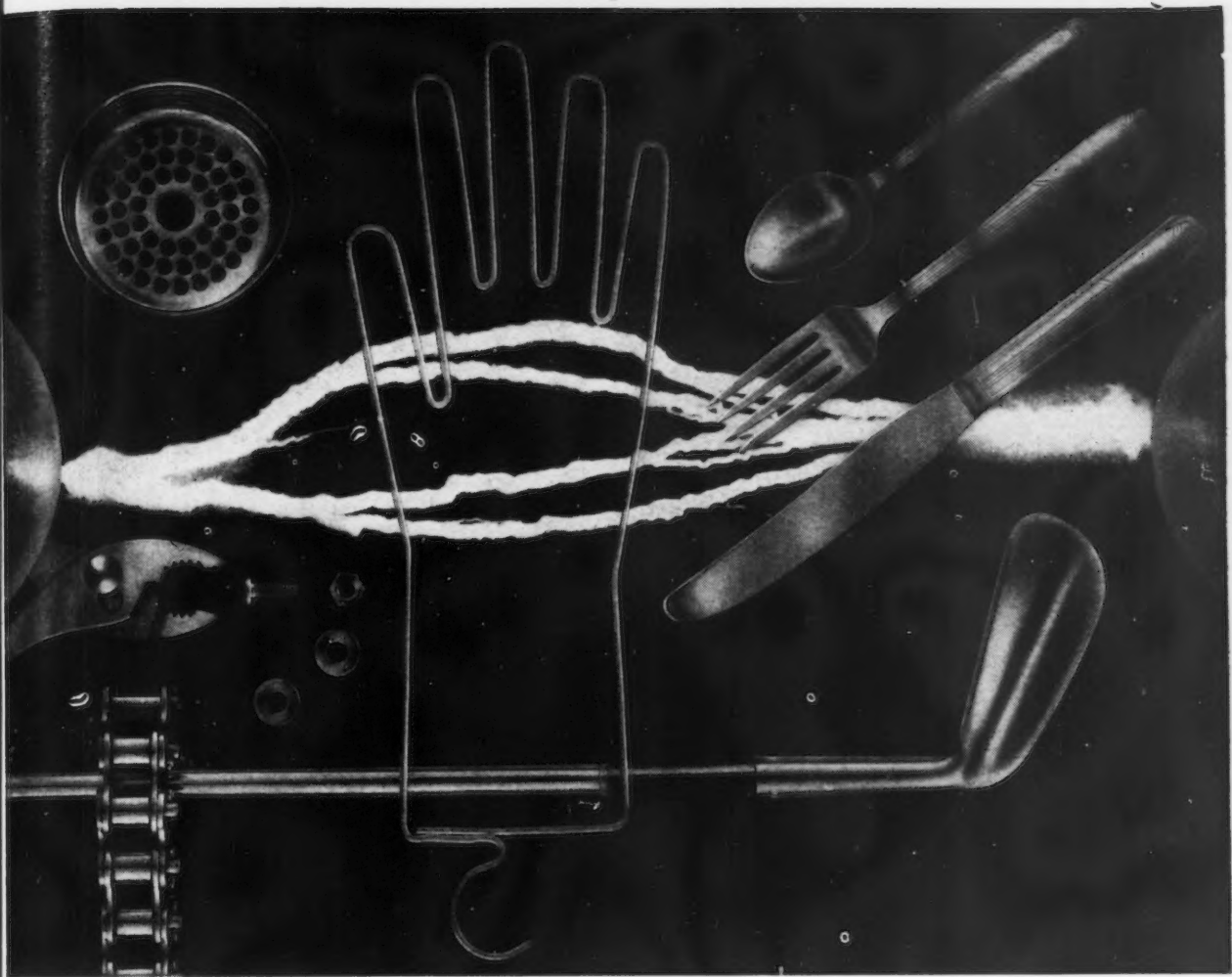
Operated during the war by Olin Industries, Inc., the plant has a

were known to the purchasers, it is probable that answers to both of these drawbacks have been found.

Principal industries of this area were not seriously affected by the rail embargo. It is likely that the lumber industry, which produces 125 million board ft a week, was the hardest hit and among the first because of the lack of adequate storage space to care for the production which is ordinarily drained away rapidly for use in the building program.

LOS ANGELES—Russell, Burd-sall & Ward Bolt & Nut Co. has acquired the plant of the Cooper Screw Mfg. Co. here, it has been announced by Samuel N. Comly, vice-president and treasurer of the purchasing company.

The new owners have other



Electricity Scrubs Stainless Steel Behind The Ears

Stainless Steel is a naturally beautiful and rustless metal—all the way through. Yet behind the gleaming finish on many products made of Stainless there's an interesting story.

Small, irregularly shaped articles could not be polished by the same methods as broad, flat surfaces. Mechanical polishing could not reach their deep recesses. So manufacturers were unable to make a wide variety of Stainless articles until a simple, inexpensive polishing process was found.

Armco research engineers set out to find it. They spent much time on the job . . . and at last succeeded. This new process is called "electropolishing." Small articles of Stain-

less Steel are suspended in an electrically-charged chemical bath, and the surface of the steel is quickly polished. It imparts a lasting lustre.

If your products are suited to Stainless Steels, just get in touch with us. For many years Armco has been the leader in developing special-purpose sheet steels and today is one of the world's great producers of Stainless Steel sheets, strip bars and wire.

Leading manufacturers choose the steel that bears the famous Armco triangle trademark. It speeds production . . . puts high quality and long life into the products they make. The American Rolling Mill Co., 4301 Curtis St., Middletown, O.

more scrap means more steel

We urge you to collect every pound of iron and steel scrap, including unused and obsolete equipment. Speed it to the steel industry through your regular channels. Present high production cannot be maintained unless more scrap is shipped to the mills promptly. The situation is critical. Act now.



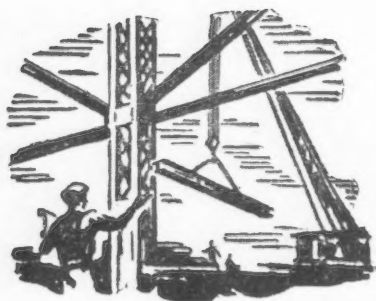
The American Rolling Mill Company

Special-Purpose Sheet Steels • Stainless Steel Sheets, Strip Bars and Wire

European Letter . . .

JACK R. HIGHT

• **Swedish Government plans expansion of steel mill built in far north during 1940 . . . \$26 millions already available for first stage of program . . . Private industry complains bitterly.**



STOCKHOLM—The biggest controversy in the Swedish steel industry at the moment is the expansion of the sole government-owned mill in the far, unindustrialized north of Sweden. The company, Norrbotten Jernverk, is located on a Baltic port at Lulea (Swedes call it "Luly-oh"). At the moment it consists simply of three electric pig iron furnaces theoretically capable of producing about 90,000 metric tons annually, and two 25-ton bessemer converters, with about 225 employees. But the Swedish Government has already appropriated 95 million Swedish kroner (\$26,388,888) for the first stage of an expansion plan, and another 40 million kroner is in the wind for the next session of parliament.

That sum is not to be spent without the receipt of considerable criticism, and a full broadside has already been aimed at the program by the private Swedish steel industry. Doing business the open-minded way, or at least believing in the freedom of expression, when the Swedish Government decides to revise its relationship with a particular industry, the specific plan is submitted to the industry involved, and to the Swedish Employers' Federation (roughly equivalent to the NAM, but with considerably wider and more in-

fluential scope) as well as two or three interested government boards and departments.

The Swedish Steel Federation, the Jungkontoret, expressed almost complete disagreement with the concept as outlined. The private firms felt considerable doubt that there was any need for the expansion of Swedish production of pig iron and heavy steel products, and suggested that if the expansion were actually essential it would be far cheaper to develop certain existing privately-owned works than to continue at the newly opened (1940) site in the far north. The employers' federation pointed out that it is essential for Sweden to be able to balance her exports, especially of iron ore, with imports, particularly of pig iron and heavy steel products.

The motives behind this government development are easily described, whether or not one agrees to all of their merits. While most of the Swedish steel firms in prewar days concentrated on the production of fine steel, whether it was alloy or good carbon steel, most of the plates, rails and structurals consumed were imported. The system worked well, with Belgium, Luxemburg and Germany importing good Swedish iron ore, making with it cheap heavy steel products and exporting them to Sweden. The development of World War II, as had its predecessor, found Sweden in the predicament of having plenty of ore but insufficient facilities to produce many essential steel products.

THE government established the first unit of the plant, beginning in 1940, choosing the location in the far north for a number of reasons. According to the official version of the story, the extreme shortage of labor in the south of Sweden was the predominant reason. There is no doubt but that the highly industrialized south has a grave manpower shortage, and that the far north is in a somewhat better position in this respect. The proximity to good ore fields and the abundance of electric power also pointed favorably to this region. The government is hoping to make the best of Sweden's bad situation, making up for the absence of important coal deposits by importing coking coal, or coke

for the Lulea plant in the same boats that export ore from the region.

Probably the strongest criticism leveled at the plant is fortunately a remediable one—that the money was appropriated before any really detailed plan had been drawn up as to the precise nature of the improvements. The steel firms stated that the program as presented was really only an outline and that no private firm would consider coming to a final decision as to the expenditure of such a sum on the basis of the preliminary information which was presented. The government, which for the most part shed criticism on the program with but little concern, admitted to me, that the program was indeed hazy when the money was appropriated.

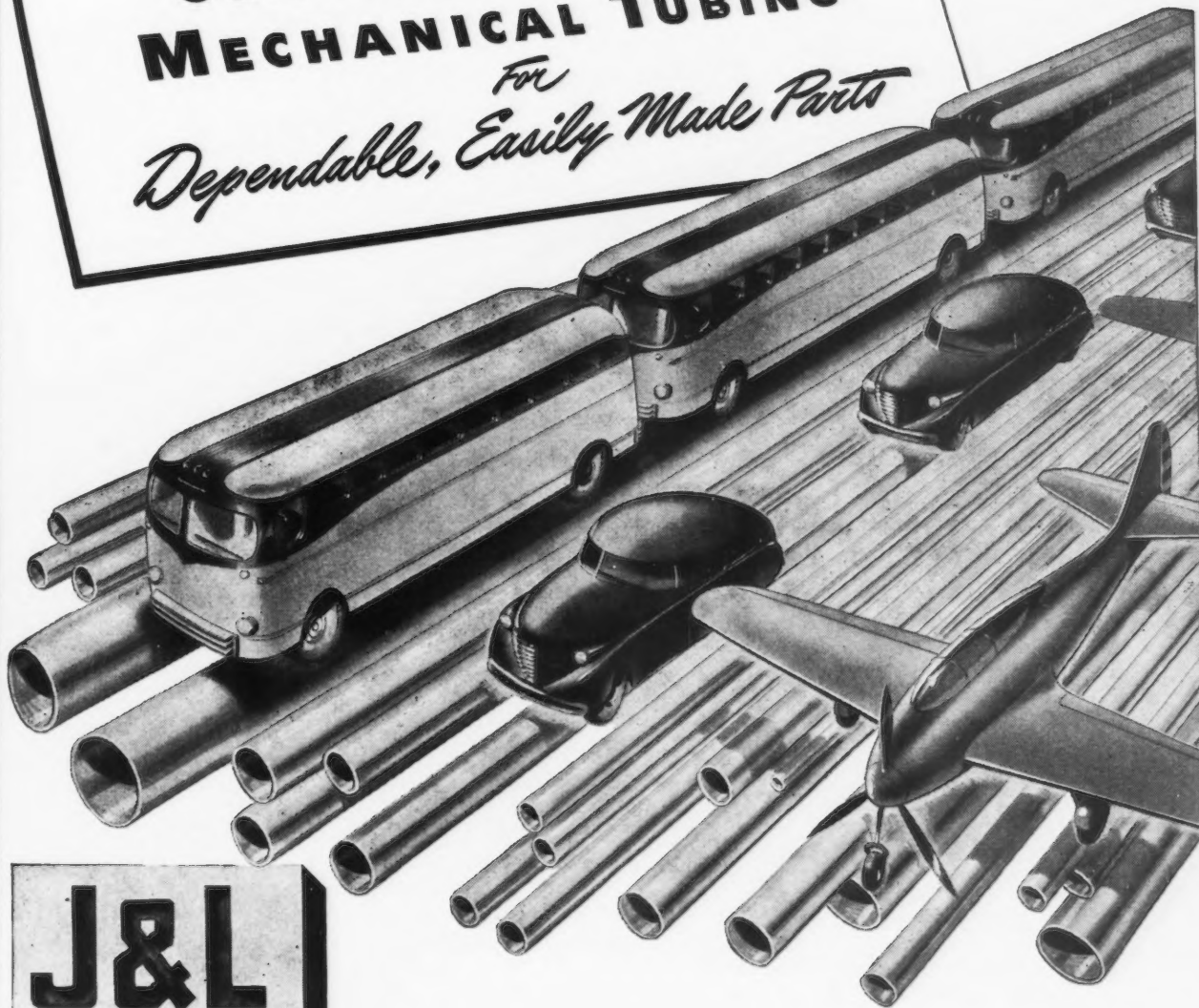
As is the problem in so many other countries, the rolling mill equipment required for any expansion program will be slow of delivery. Under the circumstances, the government company decided early this year that the wise course would be to prepare a hasty program for expansion to obtain the necessary appropriation. The actual expansion plan was drawn up in a comparatively short time, without the definition of certain details. Although the government is rather reluctant to admit the fact, I think that in a number of respects the program still has important planning work to be done before all of the outline is definitely settled.

The appropriation of the funds has made it possible for some machinery to be ordered, and parts of the work at the mill are already under way. The construction of the quay is going on, and some of the mill work is started. The ultimate design is to expand the annual capacity to about 500,000 metric tons of pig iron with the addition of two 200,000-ton coke blast furnaces. The plan calls for 350,000 tons of this to be used in the works for an annual production of about 300,000 tons of finished steel.

THE program is divided into two stages and the funds already appropriated are for the first stage only. The government hopes to see this first program completed in about 3-yr time, consisting of the first of the two coke blast furnaces, and a third 25-ton bessemer converter to go alongside

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JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH 30, PENNSYLVANIA

THE IRON AGE, December 12, 1946—99

the two presently at the site. The first stage also specifies two new 25-ton electric arc furnaces and the first rolling mills, to produce heavy plates and structurals. An expansion of the small sintering plant now in use is also included.

The second phase of the program is hardly more than a rough outline at the moment. It seems likely that it will broaden the line of products and will call for a rolling mill for certain lighter gage products. The construction of the second coke blast furnace will also be a part of the second stage. The government is a little less certain

the outlined expansion programs, both in the privately-owned and the government plants are completed by that time, 200,000 metric tons should remain for export.

As is every other country I have visited in Europe, Sweden is planning to capture a share of the world market formerly dominated by Germany. The Swedish Government realizes, however, that the absence of German imports leaves glaring gaps in the Scandinavian economy. The first effort is being made therefore to establish a sufficient production of those products which Sweden itself requires, be-

who are naturally omniscient in this field, predict that the Swedes will probably let the birthrate fall once again in the not too distant future.

The delivery of the required machinery from abroad constitutes the second fundamental problem. The firm is at present making the best possible arrangements for deliveries, and the ultimate decision as to the source of this equipment will hinge on the matter of deliveries, unless American prices go beyond reason.

As a part of the effort to integrate the Scandinavian economy where possible, a study is being made of the possibility of adjusting the government steel programs of Norway and Sweden, to prevent their overlapping unnecessarily. No details have been specified as to the nature of this cooperation, but I hope to learn more about it when I get to Oslo in a few days.

Britain Plans to Expand Aluminum Sheet Output

London

• • • Large-scale expansion of aluminum sheet production is planned in Great Britain. On a 100-acre site at Rogerstone, near Newport, Monmouthshire, a continuous rolling mill is to be built for production of aluminum sheet. Completion is scheduled for 1948.

The plan calls for a main series of rolling equipment more than a quarter of a mile in length. The plant and equipment entails an expenditure of more than \$10 million by the Northern Aluminum Co., Ltd., associate of Aluminum, Ltd., of Canada. An initial output of 56,000 tons of sheet products per annum is planned from the new mill, and if the demand warrants it provision will be made for the addition of new machinery to increase production to 168,000 tons.

The greatest annual rate of aluminum sheet production during the war from all plants in the United Kingdom was just over 112,000 tons. Company engineers have been working on the expansion plans since 1945, and have drawn on Canada for technical assistance. This extension of fabricating facilities in the United Kingdom marks a step forward in Aluminum, Ltd.'s, integration plans.



JET INVENTOR: Air Commodore Frank Whittle, center, of the RAF, inventor of the turbojet engine, receives the Daniel Guggenheim Medal for achievement in aeronautics at the annual meeting of the American Society of Mechanical Engineers. Presenting the medal is Theodore P. Wright, a former winner, and at the right is Air Chief Marshal Sir Guy Garrod.

of the exact timing of the later stage, but if the delivery of machinery makes it possible, it is hoped that the entire expansion will be completed by 1951.

The size of the expanded facility is premised on an analysis of the presumed demand in Sweden in 1950, based on a study by the government, including a perusal of the estimated demand made by the Jungkontoret. The Swedish Steel Federation estimates that by 1950 the privately-owned section of the industry will have expanded its effective capacity to 1,320,000 metric tons, and the industry feels this to be an ample figure. The Board of Trade, which is the government department concerned in the development of the Lulea works, has estimated the 1950 demand at 1,470,000 metric tons for the Swedish domestic market. If

fore the export needs are considered.

THERE will be two important controlling factors on the expansion program in the north. The primary problem, to be found in every industrial effort in Sweden today, is the shortage of labor. When the government states that the northern location was desirable from the standpoint of manpower, it is speaking only in relative terms. Due to an abnormally low birthrate in the 1920-1940 period, there is an acute nationwide shortage, both of men and women. Since 1940 there has been a substantial increase, and the government population experts foresee a long-term improvement to be felt in some 14 yr. This improvement will be too far in the future to be of much assistance to the steel program, and the experts,

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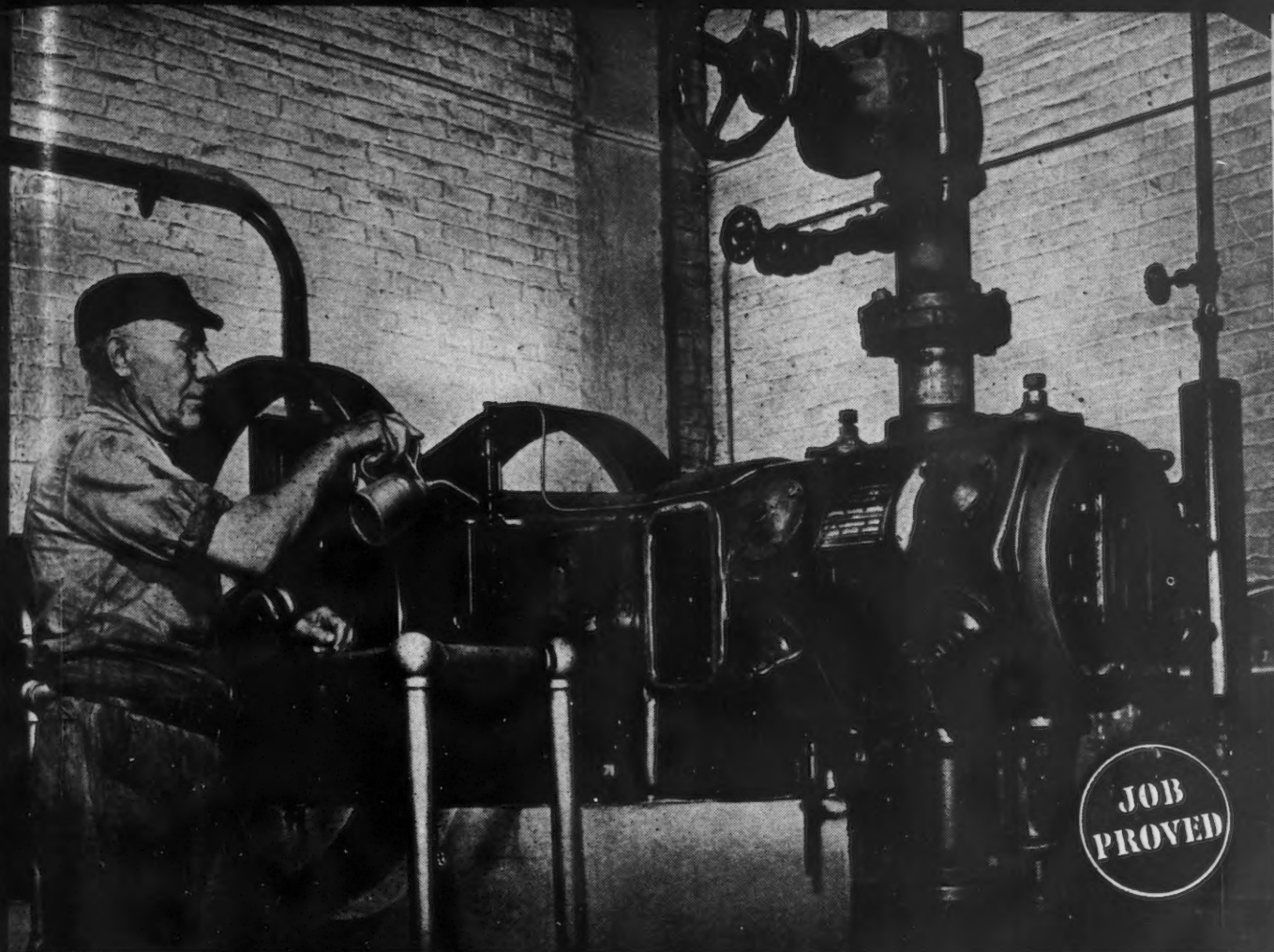
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SUN COMPRESSOR OIL...

Doubles Life of Valves and Rings in 2 Compressors, Ends Frequent Breakdowns Due to Heavy Carbon Deposits

A well-known company recently estimated a saving of \$2400 after switching to a Sun oil for lubricating two compressors.

Heavy deposits of carbon on valves and piston rings had made maintenance of these compressors a chronic headache and expense.

A Sun Engineer recommended a "Job-Proved" Sun oil that is specially refined from low-carbon stock and widely used throughout industry for compressors of this type. With this oil the life of valves and rings doubled, and management estimated they had saved \$2400 on maintenance alone.

This saving and this plant, which is now 100% lubricated by Sun, are typical of hundreds of cases where Sun Engineers and Sun "Job-Proved" products have helped to eliminate shutdowns, to cut maintenance costs, and to keep production on a continuous basis. Call the nearest Sun office for Sun "Job-Proved" service.

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ADM. BEN MOREELL, president, Turner Construction Co.

PERSONALS

• • •

• L. W. Mason has been appointed manager of the Pittsburgh sales office of National Tube Co., U. S. Steel Corp. subsidiary. He will be in charge of sales for all National Tube products in Western Pennsylvania, West Virginia, Ohio, and Eastern Kentucky. Mr. Mason was formerly manager of the company's Detroit sales office. He began his career with National Tube in 1923. C. E. Kennish, who has been acting manager of the company's Pittsburgh sales office, has been named assistant manager of sales in Pittsburgh.



CARL A. ILGENFRITZ, vice-president in charge of purchases, U. S. Steel Corp. of Delaware.

• Adm. Ben Moreel, who served as Chief of the Bureau of Yards and Docks of the U. S. Navy throughout the war and then served as oil administrator and more recently as coal administrator, has become president of the Turner Construction Co., New York.

• Edward R. Smith has been elected president of the Seneca Falls Machine Co., Seneca Falls, N. Y., succeeding Marcus A. Coolidge, who becomes chairman of the board.

• George H. Powers has been appointed boron carbide engineer by Norton Co., Worcester, Mass. He will cover the sale and application of Norbide products in the New England territory and also New York, Philadelphia, Pittsburgh and upper New York State.

• Alvin B. Thomas has been appointed manager of the Lockport plant at central foundry division of General Motors Corp., Detroit. Mr. Thomas has served previously with General Motors Saginaw Malleable Iron Div. and Bendix Products, where he was general superintendent in charge of production.

• F. G. Jewett, formerly assistant manager of sales in the Atlantic Div. of American Can Co., has been named manager of sales promotion of the company with headquarters in New York. Mr. Jewett joined American Can in 1916.

• Robert T. Dunlap, who has resigned as executive vice-president of the Colorado Fuel & Iron Corp., has become president of Great American Industries, Inc., in New York.

• T. D. Beven has been elected president of the Elgin, Joliet & Eastern Ry. Co., Chicago, succeeding T. E. Bond, who has retired after more than 38 yr of service. S. O. Rentschler has been appointed general manager of the company.

• M. E. Sheppard has been named general assistant controller of the Ford Motor Co., Dearborn, Mich. Mr. Sheppard was formerly general director of the finance and accounting division of the Fisher Body Div. of General Motors Corp.

• John J. Healy, Jr. has been appointed assistant general manager of the Merrimac Div. of Monsanto Chemical Co., Everett, Mass. He has been with the division since 1931. L. F. Loutrel will succeed him as director of the development department.

• Charles G. Purnell has been appointed manager of sales and metallurgical development of Furnace Engineers, Inc., Pittsburgh. He was formerly associated with Cabot & Co. and previously was connected with the Carnegie-Illinois Steel Corp. as contact metallurgist.

• Carl A. Ilgenfritz has been named vice-president in charge of purchases of the U. S. Steel Corp. of Delaware, Pittsburgh, to succeed Charles R. Miller, Jr. Since September 1945, Mr. Ilgenfritz has been vice-president in charge of purchases of the Carnegie-Illinois Steel Corp. He had formerly been associated with the Youngstown Sheet & Tube Co., United Alloy Steel Corp., Central Alloy Steel Corp., and Republic Steel Corp. Mr. Miller has retired after 49 yr of continuous service with U. S. Steel subsidiaries. First entering the employ of the Carnegie Steel Co. in 1897, he served in the purchasing department until 1918, when he was promoted to purchasing agent of that company. When Carnegie-Illinois Steel Corp. was formed in 1935, he became purchasing agent for the Pittsburgh district, and in 1940 was appointed director of purchases, U. S. Steel Corp. of Delaware. He was elected vice-president in charge of purchases in 1942.

• William E. Bott has been appointed chief electrical engineer, American Bridge Co., Pittsburgh. He succeeds C. B. Seagle, who is retiring after 34 yr with this U. S. Steel subsidiary. Mr. Bott started with American Bridge in 1915 as an electrician. He will be in charge of all electrical engineering for the company's six structural steel fabricating plants. Mr. Seagle, before joining American Bridge, was with General Electric Co. for several years in testing and engineering work.

PERSONALS

• **Harry B. Coen**, who recently was placed in charge of the employee cooperation staff of General Motors Corp., New York, has been elected a vice-president of the corporation. Mr. Coen, who came to the central office in 1939 after serving as manager of Flint operations for the Chevrolet Motor Div. for several years, was director of labor relations prior to his new appointment. **Louis G. Seaton**, a member of the personnel staff for 14 yr, will succeed Mr. Coen as director of labor relations. Mr. Seaton joined General Motors in 1928 as a member of the staff of the sales section and in 1932 was transferred to the personnel staff. **Roy E. Hammond** has been appointed general assistant comptroller of General Motors with headquarters in Detroit. Mr. Hammond has been assistant comptroller of the corporation since 1944.

• **Gerhardt Bartz** has been appointed works manager of the Bellevue Industrial Furnace Co., Detroit. He comes from the Dodge Forge Div. of the Chrysler Corp., where he was assistant plant engineer and employed by the corporation for more than 17 yr.

• **R. E. Farney** has been promoted to manager of the packaging methods and research division of Spiegel, Inc., Chicago. Mr. Farney has been a member of the packaging profession for 11 yr, having previously been associated with Montgomery Ward and Alden's, Inc.

• **Gilbert E. Collyer** has been appointed district manager of the Detroit office of the H. K. Porter Co., Inc. Mr. Collyer was formerly located in the general sales office at Pittsburgh, where he specialized in equipment for the processing industries, locomotives, railway specialties and springs.

• **Robert Walsh** has been appointed to head the new automotive and export department of American Car & Foundry Co. at its Wilmington, Del., plant. He entered the locomotive engineering department of General Electric Co. in 1926, where he remained until joining ACF.



J. W. HOOVER (left), general traffic manager, and **R. L. VAN CLEVE** (right), director of purchases, Carnegie-Illinois Steel Corp.

• **J. W. Hoover** has been appointed general traffic manager of Carnegie-Illinois Steel Corp., Pittsburgh, U. S. Steel Corp. subsidiary, succeeding **C. W. Trust**, retired.

In his new position, Mr. Hoover also will represent National Tube Co., American Bridge Co., H. C. Frick Coke Co., U. S. Coal & Coke Co., and Pittsburgh Limestone Corp. He started with Carnegie-Illinois in 1917 in the traffic department and was promoted to assistant to vice-president in charge of operations in 1944. Mr. Trust was appointed general traffic manager in 1940. In 1944 he was also given the title of assistant vice-president, traffic, U. S. Steel Corp. of Delaware.

R. L. Van Cleve has been appointed director of purchases for Carnegie-Illinois Steel Corp. Mr. Van Cleve was a field engineer with Riter-Conley Mfg. Co. before starting with Carnegie Steel Co. in 1914 in the open-hearth department at Edgar Thomson Works, Braddock, Pa. In 1920, he was transferred to the company's general offices, Pittsburgh, and 4 yr later was made assistant special agent. He was named manager of blast furnace products, coke byproducts and scrap in 1934 and the following year became assistant purchasing agent. Since September 1945 he has been general purchasing agent.

• **L. H. Moulton** has been appointed to the post of national sales director and **D. T. Buist**, assistant national sales director, of Turco Products, Inc. Their headquarters will be the firm's main offices in Los Angeles. Mr. Moulton joined Turco in 1931. For the past 8 yr he has directed the eastern division from the Chicago plant office. Dan Buist joined Turco in 1936. Transferred to the aviation division in 1939, he was promoted to district sales manager in 1943, and western zone sales manager in 1944.

• **W. C. Yates** has retired from the General Electric Co., Schenectady. He joined General Electric in 1898 as a student engineer on the test course. In 1913 he became commercial engineer of what is now the control division, and 3 yr later he was appointed manager of sales. In 1937 he became manager of the control and renewal parts division of the industrial divisions, and in 1941 was appointed an assistant manager of the industrial divisions.

• **Francis B. Nimick** has been elected a director of Vanadium-Alloys Steel Co., Latrobe, Pa., to fill the vacancy created by the death of the late **T. H. Childs**.

• **John A. Boll** has been named manager of the newly formed Detroit Div. of the U. S. Rubber Co., U. S. Tire Div.

• **Robert O. Bullard, Edgar L. Hubbard and John A. Beals** have been appointed to important administrative positions in the metallurgy division of General Electric Co.'s chemical department, Pittsfield, Mass. Mr. Bullard, who has been superintendent of the carbon products manufacturing division of the apparatus department, will be engineering and manufacturing manager of the metallurgy division. Mr. Hubbard, who has been sales representative for the apparatus department in Detroit, will become sales manager, and Mr. Beals, who has been in the company's traveling auditor's staff, will become division accountant.

• **Richard K. Pew** has been named service manager for the Colonial Radio Corp. with headquarters in Buffalo. He formerly was with General Motors Corp. as director of parts and service operations of the Eastern Aircraft Div. and as sales and service manager of the Delco Radio Div. in Michigan and Indiana.

• **Don Long**, merchandiser for the Ekco Products Co., Chicago, has been promoted to assistant to the president. He will work on the development of new products in this assignment.

• **Charles B. Grace**, vice-president and treasurer of the Heintz Mfg. Co., has been elected a member of the board of directors of the Pennsylvania Salt Mfg. Co., Philadelphia.



HAROLD P. CURTIS, Pacific Coast sales manager, Babcock & Wilcox Tube Co.

• **Harold P. Curtis** has been appointed Pacific Coast sales manager of the Babcock & Wilcox Tube Co. with his headquarters in Los Angeles. Before taking this position, Mr. Curtis was Pacific Coast sales manager for Rustless Iron & Steel Corp. He was associated with the Columbia Steel Co. for 8 yr, and became manager of their stainless steel sales in the southern California area. Mr. Curtis then joined the Budd Mfg. Co., working on the Pacific Coast, and later was appointed general sales manager of the Budd Co. in Philadelphia.

• **R. M. Ellis** has been elected vice-president of Hungerford Plastics Corp., Murray Hill, N. J. Mr. Ellis, who has been with the organization since its founding in 1942, retains his position as chief mechanical engineer.

• **R. F. Hilbert** has been appointed sales agent for the Vascoloy-Ramet Corp. in the Rochester, N. Y. area. Mr. Hilbert, previous to establishing his own business in 1945, spent 17 yr in the machine tool industry as a sales representative.

• **Howard H. Vogel** has been named chief engineer of the Toledo plant and **Robert K. Christie** has been appointed director of research for spark plugs of the Champion Spark Plug Co. Mr. Vogel has been with Champion for the past 14 yr while Mr. Christie joined the organization in 1943 as a research engineer.

• **Henry W. Parker** has been appointed technical adviser for Sylvania Electric Products, Inc., New York. Prior to joining the Sylvania staff he was connected with the radio tube industry at the General Electric Co. in Schenectady and Rogers Radio Tubes Ltd. of Toronto.

• **Clarence H. Sample**, formerly chief engineer of Rheem Research Products, Inc., has joined the electroplating section of the nickel sales department of the International Nickel Co., Inc., at New York.

• **Charles Nelson**, 74, former mechanical department superintendent of the Bethlehem Steel Co. at Lackawanna, N. Y., died Nov. 24. He came to the Lackawanna plant in 1903 from Chicago and retired in 1941.

• **Brynn Belyea**, 47, industrialist of the West Coast, died Nov. 25. Mr. Belyea had been president of the Belyea Truck Co. and the Pacific Crane & Rigging Co. of Los Angeles.

• **Harold W. LaGanke**, 50, manager of distributor sales for the National Screw & Mfg. Co., Cleveland, died suddenly Nov. 24. He had been with the company for 29 yr.

...OBITUARY...

• **William Werme**, 65, died suddenly Nov. 30. He had been with the Worcester Pressed Steel Co. since 1905, and had been a director and general superintendent for over 30 yr.

• **Thomas G. Pritchard**, 85, who retired in 1929 as superintendent of the Continental Works of National Tube Co., Pittsburgh, died Nov. 25. He had been with the Tube Co. more than 60 yr.

• **Arthur J. Eaton**, 85, former assistant treasurer of the J. I. Case Co., Racine, Wis., who retired last April, died Nov. 20.

• **John Henning**, 69, master scaleman of the Wickwire Spencer Steel Div. of the Colorado Fuel & Iron Corp. in Buffalo for the last 18 yr, died Nov. 24. He had been with Wickwire Spencer since 1912, operating the company's first pig iron machine for 6 yr.

• **William R. Palmer**, 89, died Nov. 30 after 70 yr service in the steel industry. Mr. Palmer started with the Cleveland Rolling Mill Co. in 1873 which later became the American Steel & Wire Co. He was later general superintendent of the TCI Co., and then vice-president and general manager of the American Tube & Stamping Co., Bridgeport, Conn. Mr. Palmer retired in 1943.

NORTHERN CRANES

HAVE AN
**EXCEPTIONAL
RECORD** IN

Repeat Orders



Cranes are long wearing machines—do not, ordinarily, stand high in repeat business.

But Northern Cranes have built an exceptional record in repeat orders. A large proportion of our customers regard us as their prime source of cranes—reorder from us when new crane equipment is needed.

One customer has bought 645 Northern Cranes over a period of years. Many customers are regular purchasers—have large numbers in operation.

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HOIST CRANES • HAND CRANES • ELECTRIC HOISTS
AIR HOISTS • SPECIAL CRANES AND HOISTS

Dear Editor:

back number periodicals. The address of the Society of Naval Architects and Marine Engineers is 29 W. 39th St., New York.—Ed.

PLASTIC ADHESIVE

Sir:

A "Newsfront" item on p. 45 of the Nov. 7 issue, refers to a plastic adhesive which gives very strong joints between metals. Can you tell me where more information on this product and process can be obtained?

Pal Blade Co., Inc.
Holyoke, Mass.

R. L. WOOD

Sir:

... We are anxious to contact the Sonntag Scientific Corp., with a view to locating the manufacturers of the plastic adhesive and would esteem it a favor if you let us have their address.

Peckover's, Ltd.
Toronto

R. TRELFORD

● The adhesives used in the test mentioned in "Newsfront" were Cycleweld, developed by Chrysler Corp., Detroit, and Redux, by Resinous Products Chemical Co., Philadelphia. It is understood that these adhesives are chemically similar. The Sonntag Scientific Corp. which conducted the fatigue test is an affiliate of the Baldwin Locomotive Works, Philadelphia.—Ed.

NEW PRODUCT SETUP

Sir:

The article, "Setting Up for a New Product" by L. S. Whitson, appearing in the Nov. 7 issue, is very interesting and of a tremendous value to us. We wish to apply some of the principles set forth, to our own organization. Since four copies of the article would facilitate matters for us, we wish to place an order for these copies.

GEORGE Z. ANDERS
Management Engineering Div.
Naval Torpedo Station
Alexandria, Va.

● We are pleased to furnish four tear sheets with our compliments.—Ed.

LARGEST HOBBER?

Sir:

My attention has been called to an item appearing on p. 87 of the Oct. 31 issue, which refers to "one of the largest gear hobbing machines ever built in this country." The item describes the machine as having a 36-in. center distance. Actually this machine is a relatively small one when compared to the gear hobbers in use by the Cone-Drive Div., Michigan Tool Co. This company has several Gould & Eberhardt 80 EW hobbing machines which will produce gears of a maximum diameter of 90 in. with an 18-in. hob and pinions or worms of 18-in. max diam. Maximum center distance is 52 in. . . . You will see from this that the machines used at Michigan Tool will generate gearing many times

as powerful as those producible on the hobbing machines which you mention as being "the largest."

ATHEL F. DENHAM
Denham & Co.
Detroit

TRUTH THAT HURTS

Sir:

I have read and reread "So You're Designing a New Product!" appearing in the Oct. 31 issue, and am still fascinated. Never have I seen a more brilliant example of the "truth that hurts" or "history repeating itself." It all has a familiar ring. This article should be required reading for every business executive and every engineer having responsible charge. Please send my personal congratulations to Author Hendrick and send me two copies of the article if any are available.

IRA JACOBSON
Basic Industries Dept.
Allis-Chalmers Mfg. Co.
Milwaukee

WELDING INFORMATION

Sir:

Please send information regarding welding of steel. I am a student at the present moment, but expect to open my own shop in the near future. I would appreciate any information you can send me.

JOHN D. AUGHE
215 McDaniel St.
Dayton

● That is a real question, Reader Aughe, and it is hard to know where to begin. The most effective beginning would be a subscription to THE IRON AGE, where you will be kept advised of the very latest in welding developments. Too, the new edition of our "Welding Manual" will provide you with an extensive picture of modern techniques in all types of welding. Another suggestion would be to write to the leading makers of welding equipment (whose names can be found in any issue of I.A.) asking them for some of the very excellent instruction manuals they have prepared from time to time.—Ed.

SHIPBREAKING WITH GAS

Sir:

In November, 1923, you published an article entitled "Ship Scrapping with Oxy-acetylene," Vol. 112, No. 20, pp. 1303-06. I would like to purchase a copy of the article if it is available. Also we would like to know where to contact the publishers of the periodical issued by the Society of Naval Architects & Marine Engineers.

R. B. STEVENS
General Manager
Powers Shipyards
North Bergen, N. J.

● We regret we have neither tear sheets nor an available Nov. 15, 1923, issue. However, you may be able to obtain a copy of the issue from H. W. Wilson Co., 950 University Ave., New York 52, which deals in

TIME STUDY CALCULATIONS

Sir:

We would appreciate receiving your booklet on time study calculations.

C. H. VENNEL
Socony-Vacuum Laboratories
Paulsboro, N. J.

● The booklet entitled "Techniques and Time Study," which is available at 60¢ a copy, has been forwarded.—Ed.

EXPORT PROBLEMS

Sir:

During this year we have been receiving your publication, and in our desire to establish business with some U. S. steel mills producing galvanized pipes and sheets, cold-rolled sheets, barbed wire, staples, soft galvanized wire, tin plates, copper, zinc, lead and tin in pigs, we have written directly to steel factories who advertise in your magazine. We have had no success with this policy and are now appealing to you for help in our desires. . . .

INTERCONTI
Exportadora e Importadora Ltda.
Sao Paulo, Brazil

● The export market these days is indeed confused, what with the tightness in steel supplies, export licenses, and exchange problems. The coal strike has further aggravated the situation. Our suggestion is that your interests would be best served if you were to contact some export firms in the U. S. Their familiarity with the general steel picture should enable them to take fullest advantage of every opportunity for acquiring steel for export.—Ed.

FURNACES AND MOLDS

Sir:

... We manufacture soft metal melting furnaces and water-cooled molds that are used for the casting of ingots in the printing industry. Can you furnish us with names of companies that would be in a position to fabricate these items for us? We would be glad to furnish them with the necessary blueprints for consideration.

W. H. STREET
Vice-President
United American Metals Corp.
Brooklyn

● We are forwarding a list of plants engaged in manufacture of soft metal melting furnaces to whom we suggest you submit your specific requirements.—Ed.

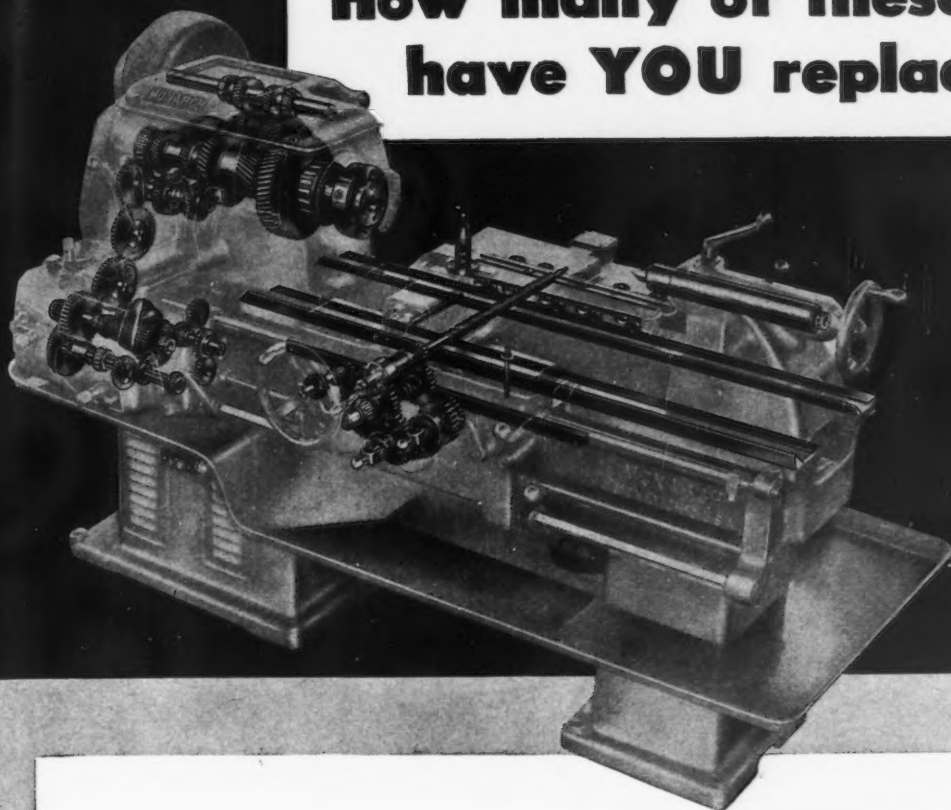
CAST IRON SELECTION

Sir:

We have noted with interest the articles appearing in the Oct. 17 and 24 issues under the subject, "A Practical Method of Selecting the Correct Type of Cast Iron," by K. R. Geist and W. A. Hambley. We would appreciate receiving two reprints of this series.

S. P. SNYDER
Technical Advisory Service
Revere Copper & Brass, Inc.
Dallas

How many of these parts have YOU replaced?



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THE MONARCH MACHINE TOOL COMPANY • SIDNEY • OHIO

Industrial News Summary...

- **Steel Rate Stages Comeback**
- **Steel Labor Takes Spotlight**
- **Export Steel Prices Advanced**

STAGING a quick comeback following the end of the coal strike, the steel industry this week raised its operating rate $9\frac{1}{2}$ points to 70.5 pct of rated capacity. There is every indication that activity next week will rebound 10 to 15 points more with the probability that 3 weeks after the end of the coal strike, the industry will be almost back to the prestrike ingot rate of 91.5 pct.

With every steel plant straining its equipment this week to regain lost ground as rapidly as possible, steel customers were faced with the sad news that irreparable loss in steel production because of the coal strike will ultimately amount to more than 1,700,000 tons. Equally serious to steel users will be the time-consuming process of realigning delivery schedules in an attempt to reach the normal shipping level.

With the threat of a coal shutdown definitely postponed until Apr. 1, 1947, the probable outcome of steel wage negotiations again takes the spotlight. While the steel union is expected to shape its militant activity on a basis which is expected to be made clear when the Supreme Court rules on the Government-UMW contract, there are many in the steel trade who continue to be apprehensive over the possibility of an interruption in operations if the union and major steel producers reach a stalemate in wage negotiations.

THE steelworkers' union, unlike the UMW, is in a position to call a strike providing a vote is taken and the proper notification to the steel companies is made. Demands by the USWA are expected to be substantial and the wage increase may start at 25¢ an hr as a bargaining factor. In addition to the demand for wage increases the steel union is expected to extend every effort toward obtaining some type of health and welfare fund and also move to obtain some form of a guaranteed annual wage.

Failure to obtain health and welfare and guaranteed annual wage provisions would hardly be a sufficient reason for a national steel strike. On the other hand, despite the experience of the coal miners and their union recently, the failure of the USWA to negotiate quickly a substantial wage increase before present contracts expire on Feb. 15 could conceivably bring about a national tieup in steel production.

One optimistic factor now present in the impending steel wage negotiations which was absent last January is the freedom of steel companies to adjust their steel prices to any point necessary to absorb higher labor costs. For this reason the meeting between Philip Murray of the USWA and the U. S. Steel Corp. will represent for the first time an attempt at free collective bargaining without the interference of the Government. Whether or not steel companies would be willing to boost steel prices the

amount necessary to absorb a substantial wage increase is questionable in view of the inflationary aftermath which would follow such a steel price increase into other industrial price structures.

Within the past week practically all producers of pig iron have advanced their prices \$2.00 a ton. This recent advance brings THE IRON AGE composite price of pig iron to \$30.14 a gross ton which compares to a composite price of \$23.61 a ton in 1941 when controls were instituted. Higher labor costs and higher prices for coal were given as the major reason for the most recent advance.

MANY steel companies last week announced price changes which had the effect of readjusting base prices on some flat-rolled items as well as making substantial increases in the extra charges for these products. In most cases the base prices which represent the f.o.b price at the mill without extra and freight charges were changed but little, but because of the adjustments in the extra charges and the rearrangement of base gages the net increases to steel consumers ranged from \$2 to \$5 a ton on some products.

The price changes made recently are not important ones and cover only a small tonnage of total steel shipments. It is expected that further adjustments on other products will be made soon, but it was apparent that the products involved will be those on which steel companies have been claiming a loss or a low return. No general across-the-board increase in steel products is expected until final negotiations between the steel union and major steel companies are completed. THE IRON AGE composite price for finished steel this week was 2.72122¢ per lb compared to last week's quotation of 2.70711¢ per lb. United States Steel Corp. has announced a price of \$5.75 per base box of tinplate effective Jan. 1, 1947. The current price is \$5.00 per base box. The OPA had allowed a price of \$5.25 per base box on Mar. 1 of this year, but previous contracts with can companies at \$5.00 per base box made it impossible for steel companies to realize the \$5.25 base box quotation this year, except in a few incidents.

MOST steel companies this week had posted substantial increases in export prices. These increases, it was plain, were made to approach world prices of various steel products. Some of the more important quotations on steel items for export are as follows: Tinplate \$6.60 a 100-lb base box f.a.s.; reinforcing bars \$3.10 per 100 lb f.a.s.; ingots \$44 a gross ton; hot-rolled strip \$2.85 per 100 lb; hot-rolled sheets \$3.18 per 100 lb; and hot-rolled bars \$3.25 per 100 lb. These export prices represent an average of more than 10 pct above current domestic prices, and it was claimed that while the new quotations bring American prices closer to world levels, it was argued that they are still lower than foreign prices on most of the items involved.

• **EX-SERVICEMEN ON STEEL PAYROLLS**—A recent report made by the American Iron & Steel Institute covering 32 iron and steel companies, reveals that 137,318 ex-servicemen were on the payrolls of those companies as of the end of July this year. The ex-servicemen represented 26.7 pct of total employment at that time. During the period from May 1940 through July 1946, the accumulated total inducted into the Army or Navy was 201,488. That figure is equivalent to slightly more than 39 pct of the total number of employees on the payrolls as of July this year. The individual percentages ranged from a low of 20 pct in one company to a high of 75 pct in another. Of the veterans now on steel industry payrolls, only one out of each 81 required special job placement by the medical and personnel departments of the companies because of mental or physical disabilities acquired in service.

• **LEAD IMPROVING**—An increase in the amount of secondary lead for replacement storage batteries will permit the production of an additional 450,000 batteries or approximately 15 pct in battery production during the fourth quarter according to an announcement by the Civilian Production Administration. The quota boost is based on an expected improvement in the supply of secondary lead as a result of price decontrol. Secondary lead is produced entirely from scrap material.

• **BIDS ON CHICAGO STEEL PLANT**—Final action on disposal of the \$91 million government-owned steel plant at South Chicago, Ill., leased by the Republic Steel Corp., probably will be taken before the first of the New Year, WAA announced on Dec. 5 after receiving new bids for the plant. It is the government's second largest wartime steel plant. In line with notice he sent to WAA shortly before the bids were opened, Henry Kaiser made no bid. Three offers were received at the reopening of bids. Republic submitted three proposals: (1) \$5 million cash and \$1½ million annually for 20 yr for a total of \$35 million; (2) \$27 million cash; (3) a 10 yr lease with 5 yr options for a maximum of 25 yr with rentals based on the plant's production. P. D. Fitzgerald, representing Chicago Industrial Engineers, bid \$33 million for land, buildings and equipment. Proposed terms \$5 million cash and the remainder in 12 yr at 4 pct. C. A. Depue, president, Central Steel Tube Co., Clinton, Iowa, bid \$20 million cash. His previous bid was \$19,230,000.

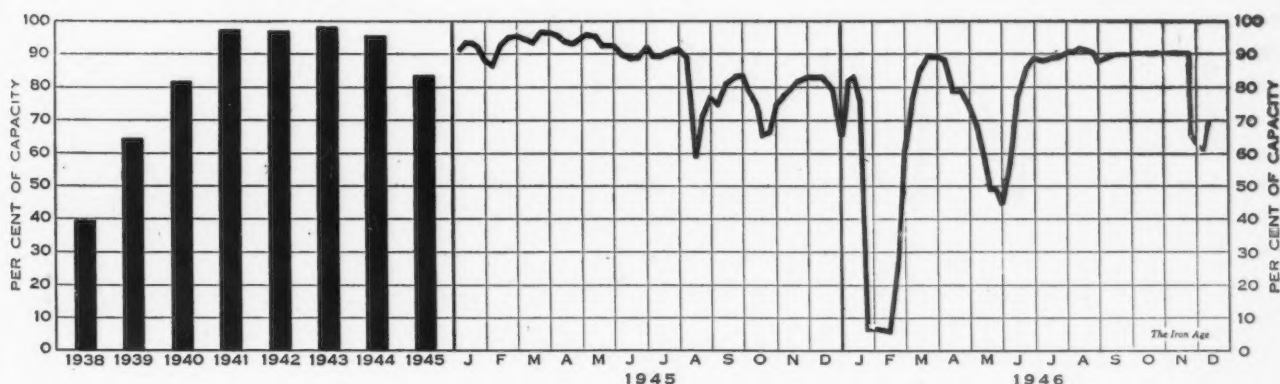
• **ALCOA WAGE CONTRACT EXTENDED**—The present wage contract of the Aluminum Co. of America with the CIO-USWA has been extended until negotiations could be resumed on Jan. 6, 1947. An interim meeting, for another preview of the dual demands, will be held in Pittsburgh on Dec. 20. Principal demands already placed before Alcoa by the union are for a guaranteed annual wage, new security and welfare provisions, modification of the overtime systems, new security and welfare provisions, and changes in working conditions. No wage demands have been made, this being left open until after the meeting of the CIO-USWA policy committee meeting in Pittsburgh on Dec. 18. The company has proposed a number of alterations in the "working rules." More than 20,000 employees in eight Alcoa plants will be affected by the final outcome of negotiations.

• **WALKING TIME PAY**—The CIO, on Dec. 9, filed suit in the Federal Court of Pittsburgh against Carnegie-Illinois Steel and National Tube Corp. for \$120 million retroactive portal-to-portal-pay. The steel workers are represented by Attorney C. J. Margiotti.

• **STRIKE TAKES STEEL DOWN**—Although steel operations during the first 3 weeks of November were at the highest weekly levels this year, the coal miners' strike reduced November's total steel production to 6,378,606 net tons of ingots and steel for castings according to the American Iron & Steel Institute. In October a peacetime record of 6,909,597 net tons (revised) was established. The average operating rate during November was 84.4 pct of capacity, compared with October's 88.5 pct rate. However, the November rate was above the rate of 78.9 pct for November 1945, when operations were recovering from another coal strike. For the first 11 months of this year ingot production totaled 60,631,782 net tons. This figure exceeds production for the first 11 months of any previous peacetime year.

• **PIPE ORDER PLACED**—Orders for sufficient tonnages of 20-in. pipe for a 650-mile crude oil line from Texas to Illinois for the Magnolia Pipe Line Co. have been placed with National Tube Co. and Youngstown Sheet & Tube Co. Magnolia, a subsidiary of Socony-Vacuum Oil Co., expects delivery of the pipe to begin early next spring. Stanolind Pipe Line Co., a subsidiary of Standard Oil of Indiana, has about completed plans for a 625 mile 20-in. crude line from Oklahoma to Indiana.

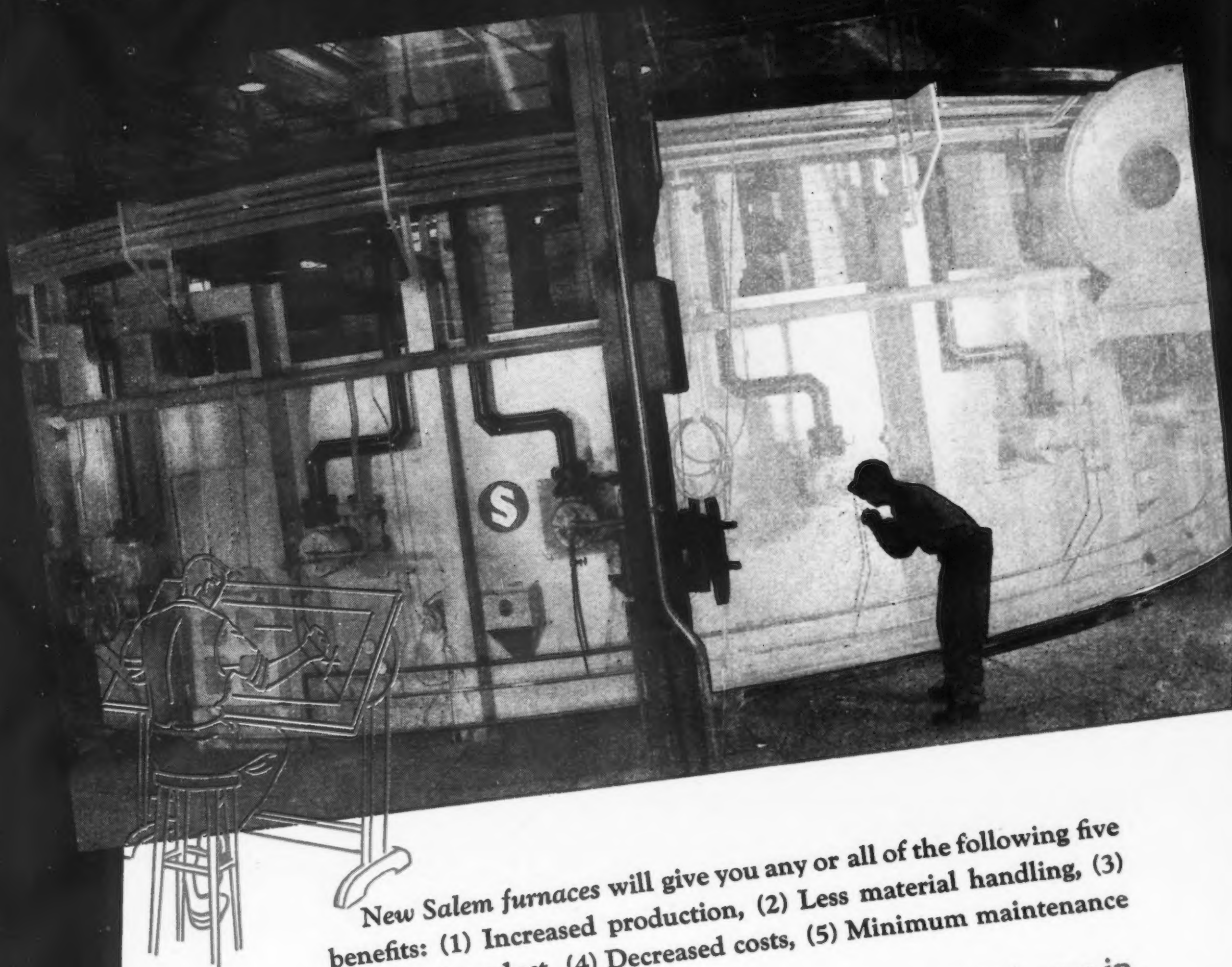
Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
December 3...	52.0	76.0	41.0	46.0	99.0	55.5	75.5	41.0	103.0	75.0	99.0	60.0	70.0	81.0
December 10...	69.5	77.5	44.0	60.0	99.0	67.0	80.5	60.0	104.5	75.0	91.4	66.0	75.0	70.5



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TORONTO, ONTARIO, CANADA
LONDON, ENGLAND

Steel Producers Increase Steel and Iron Prices

New York

••• Major steel producers are announcing new base and extra price increases on selected steel products, including sheets, strip and wire products. In some instances these price changes incorporate modification of base grades and gages and are based on industry recommendations to OPA before price decontrol.

Carnegie-Illinois Steel Corp., Bethlehem Steel Co., American Rolling Mill Co. and Inland Steel Co. have revised base prices and extras on hot-rolled, cold-rolled and galvanized sheets. The new base price on hot-rolled sheets at Pittsburgh, Buffalo, Sparrows Point, Middletown, Ohio, and Chicago is \$2.50 per 100 lb, a price increase of \$1.50 a ton. Cold-rolled sheets based at Buffalo, Middletown and Chicago have been readjusted to a price of \$3.20 per 100 lb as compared with the former price of \$3.275. Although this price adjustment appears to be a decrease, it actually represents about a \$3.00 a ton price rise when extras are considered, as base now calls for commercial quality sheet and mill run sheet is no longer produced.

Bethlehem has discontinued the Buffalo basing point on galvanized sheets inasmuch as it no longer produces that product there. The price for galvanized sheet based on 10-gage stock at Sparrows Point, Middletown and Chicago has been established at \$3.55 per 100 lb. The former price of galvanized sheets was \$4.05 per 100 lb for 24-gage stock. Coating extras have been increased to reflect the additional cost of slab zinc since decontrol became effective. Bethlehem has discontinued the production of hot-rolled and hot-rolled and pickled sheets in gages lighter than No. 16. For orders of thinner gages, cold-rolled sheet will be delivered and billed for. Extras, generally, have been increased, including gage, size and pickling extras.

The American Rolling Mill Co. and Carnegie Illinois have established a price of \$3.55 per 100 lb for enameling iron, 12 gage. This product was formerly based on 20 gage sheet at \$3.80. Using the

By JOHN ANTHONY
Eastern Regional Editor

• • •

new price with extras, the price of 20 gage would now be \$3.95 per 100 lb. Both have also increased long ternes of commercial quality to \$3.55 per 100 lb. This product was formerly sold at \$4.05 per 100 lb for unassorted commercial coating quality.

Sharon Steel Corp. and Carnegie-Illinois Steel Corp. announced a price increase on hot-rolled carbon steel strip to \$2.50 per 100 lb without a width differential at 6 in. For strip over 6 in. this is a \$3.00 per ton increase; on strip 6 in. and under, the increase is \$1.00 per ton. Sharon is the only cold-rolled strip producer which has announced a price increase on this product although it is expected that the American Steel & Wire Co. will make an early announcement. Sharon's new price for cold-rolled strip up to 0.25¢ based at Youngstown is \$3.20 per 100 lb. This represents a price increase of \$3.00 per ton. Sharon's new hot-rolled strip extras have been published but there has been no action taken yet on cold-rolled extras.

Wire products price increases have been announced by the Northwestern Steel & Wire Co. of

Kokomo, Ind., and the Keystone Steel & Wire Co., Peoria, Ill. Both companies have announced price increases of 25¢ on annealed fence wire and annealed galvanized fence wire, making the price of the former \$3.75 per 100 lb, the latter \$4.10. Galvanized barbed wire has been increased by Northwestern 10 base column numbers; by Keystone, 15 columns, 50¢ and 75¢, respectively. Field and poultry fencing have been increased by Northwestern 7 base columns; by Keystone, 10 columns, 35¢ and 50¢, respectively.

Bethlehem Steel Co. and Jones & Laughlin Steel Corp. have increased the welding quality extra on welding wire by 50¢. The Buffalo Bolt Co., North Tonawanda, N. Y., and the Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y., have announced price increases in bolts, nuts, cap screws and rivets. However, it is indicated that these increases reflected in revised discounts to dealers may be temporary in nature and will be revised when more detailed cost figures are obtainable.

Most major pig iron producers have now announced across the board increases of \$2 per ton on all grades. In Buffalo the increase in basic pig iron amounted to \$2.50, which brings the basic price there in line with schedules prevailing in other pig iron centers.

BOMBS BEGIN HERE: From this plant on the Ottawa River near Chalk River, Ontario, come some of the materials for the release of atomic energy. It is the Petawawa pilot plant, part of the U. K.-U. S.-Canadian project which this month, celebrated the fourth anniversary of the successful discovery and control of a self-sustaining nuclear chain reaction.



Plan for Guaranteed Annual Wage Will Be Offered by O'Mahoney

Washington

••• Doubt exists that anything will be done about it at the new session of Congress, but proposed legislation establishing the guaranteed annual wage has been flushed by the recent White House inspired interim report on that subject by OWMR's Advisory Board.

The first to come out with an announcement that he will offer such legislation was Senator Joseph C. O'Mahoney, D., Wyo., former head of the TNEC, which held long drawn out hearings on the economy of the country with big business as its principal target. Senator O'Mahoney, recently reelected, and now a member of the minority party, emerged from a conference with President Truman on Dec. 3 and told newspapermen that he will ask for legislation at the first session of the new Congress for a guaranteed annual wage in the basic industries, such as steel and coal.

He said he had told the President of his plan. So far, the White House, while asking that the study be made, has never indicated whether it favors the plan or if it does how broad its application could be made. OWMR's report said in effect that it could be applied on a wide scale even includ-

ing seasonal industries, a position that is sharply challenged by management in such industries.

Senator O'Mahoney's plan would in reality be underwritten to a considerable degree by taxpayers. This is evident by reason of a statement by the Senator. He said that he will incorporate his plan in labor legislation "which is certain to be introduced," without of course, making the plan mandatory in the hope it could be encouraged if the government granted tax offsets to employers applying the plan.

From Senator Ball, R., Minn., and Senator Hatch, D., N. M., came statements that they had joined forces in a "preliminary attempt" to work out a bi-partisan guaranteed annual wage plan that could be adopted by most industries through conceding that it cannot

be applied to all industries. Such a plan they declared, would help stabilize the country's economy. They plan to hold meetings with executives in industries which operated the plan, such as in soap and shoes.

Senator Hatch said that even in the seasonal industries wage guarantees could be granted without increasing costs to employers by more than 6 pct if they were coordinated with the system of unemployment compensation.

"So long as the present hourly wages prevail," said the Senator, "you will never have any solution of labor problems."

The guaranteed annual wage plan, he declared, offers such a solution. He added that it has worked wherever it has been applied.

CPA Restrictions On Delivery of Bituminous Coke Still in Effect

Washington

••• Despite the ending of the coal strike, CPA restrictions on deliveries of bituminous coke, including intra-plant deliveries, will remain in effect. CPA officials told THE IRON AGE on Dec. 10, that the restrictions, embodied in Dir. 17 to order M-21 and effective Dec. 6, would stay on the books for at least several weeks, largely be-

cause of the critical shortage of coke in manufactured gas utility plants.

Under Dir. 17, producers and dealers of bituminous coke are prohibited from delivering any coke to any person except the following:

(1) Users of coke for public sanitary services or for the production of gas for public use.

(2) Food processing plants, refrigeration plants or producers of dry ice.

(3) Wholesale or retail coke dealers.

(4) Persons who certify that coke is required to prevent irreparable damage to industrial facilities.

(5) Persons who have been specifically authorized in writing by CPA. This covers cases of public emergency.

The above restrictions also apply in the case of coke produced after Dec. 6, 1946, to deliveries from the producing branch division or section of a plant which makes bituminous coke for its own uses to another branch, division or section of the same plant. However in the case of such integrated producers if there are no orders for coke from persons described above, these plants may continue to use the coke for other purposes but must promptly notify CPA of the quantity and character of the coke on hand and also the amount which can be produced during the next 30 days.

LIGHT WORK: By making these truck tire flap curing rims from 2S aluminum, the American Welding & Mfg. Co., Warren, Ohio, effected a weight saving of 60 pct over the steel rims they replace. The 12-lb rims are rolled from 3/16-in. flat aluminum strip and flash butt resistance welded.



Freight Rise Means 14-Pct Jump for Iron and Steel

Washington

By L. W. MOFFETT
Washington Bureau

••• Nation-wide rail and water rate increases granted by the Interstate Commerce Commission in its decision Dec. 6, effective Jan. 1, will have the net effect of boosting the present freight carrying charges on pig iron, iron and steel products and steel scrap 14 pct in all territories except in the east or Official Classification territory. In Official Classification territory the increase will be 8.7 pct. The commission authorized a flat increase of 20 pct on these products, subject to a maximum of 10¢ per 100 lb but not in excess of \$2 per net or gross ton, as rated. These advances, however, were based on the rate structure prevailing prior to the emergency general rate increases which became effective July 1, 1946. These latter increases were superseded by the decision of last week. Emergency rate increases on these products were 6 pct except in the east where the increases were 11.3 pct.

The commission estimated that the newly granted increases in freight rates and passenger fares will yield \$1 billion annually, held to be necessary by reason of higher costs of materials and increased wages. The boosts in rates on iron and steel were above those asked by the railroads.

Included in the overall average increase in rates of 17.6 pct authorized by the commission were steel-making raw materials, such as iron ore, coal, coke and dolomite.

Boosts in this category were:

Iron ore—Increased 12¢ per ton, gross or net, as rated except rates to or handling charges at the upper lake ports. The commission declined to increase these handling charge or upper Lake Superior rail rates. The 12¢ increase leaves a net advance of 10¢ in the east; 9¢ in the southern and western districts and 9¢ and 8½¢ on interterritorial traffic since the respective emergency rate increases were 2¢, 3¢ and 3¢ and 3.5¢ per ton, net or gross, as rated. The 12¢ increase is about 10 pct in rail rates and approximately 3¢ per ton, or 25 pct in the handling charges for each transfer between car and boat.

Upper Lake emergency rail rate

increases, now to be cancelled, were 2¢ per gross ton in the east, 3¢ in the southern and western districts, and 3¢ and 3½¢ on inter-territorial territory. With the lower rates restored they again will be 81¢ per gross ton from the Minnesota ranges to the upper docks; 78¢ from Michigan and Wisconsin mines to Escanaba, Mich., and Ashland, Wisc.; and 54¢ from the Marquette range to Marquette, Mich.

Anthracite and bituminous coal and coke—Increased 15¢ per net ton or 17¢ per gross ton on all basic rates up to \$1 per ton as rated; increased 25¢ per net ton or 28¢ per gross ton as rated on basic rates over \$1 and not over \$2.25 per ton as rated; increased 30¢ per net ton or 34¢ per gross ton as rated on basic rates over \$2.25 per ton as rated. Emergency rates increases, which when deducted constitute the net increases just granted, were 6¢ and 7¢ per net or gross ton on rates of \$1 and less and 8¢

and 9¢ per net or gross ton on rates of more than \$1 per ton.

Raw dolomite—Increased to a maximum of 30¢ per ton when in closed equipment; increased 15¢ a ton when in open equipment.

Among other products whose rates were increased are:

Alumina and bauxite ore—Increased 12¢ per ton, gross or net, as rated.

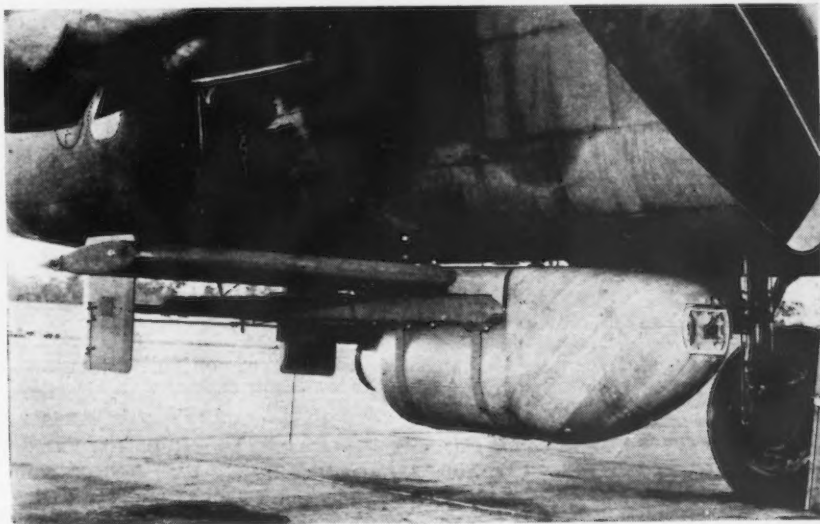
Fluxing stone and furnace slag—Increased 15¢ per ton.

Aluminum, pig, ingot or slab—Increased 20 pct, subject to a maximum of 10¢ per 100 lb but not in excess of \$2 per net or gross ton as rated.

Aluminum bars, castings, pipe, sheet ware and aluminum articles—Increased 20 pct, subject to a maximum of 12¢ per 100 lb but not in excess of \$2.40 per net or gross ton as rated.

Rates and charges for switching, including intraplant and intra-terminal switching, whether or not absorbed by line haul carriers, were increased 25 pct. Where tariffs provide for absorption of charges for switching subject to a stated minimum revenue for a line haul carrier the minimum was increased by the same amount as the charge or charges for switching.

GLIDE BOMB: Television controlled glide bomb slung under the fuselage of a B-25 Mitchell bomber. The Army has disclosed that glide bombs were first used against the Nazis at Cologne. Either a standard 1000-lb or 2000-lb bomb can be fitted to the special glide airframe. Other bombs are controlled by radar, radio or other "seeker" devices.



Canadian Basic Steel Mills Return to Prestrike Operating Levels

Toronto

••• Canadian basic steel mills have completed their return to normal operating schedules and with output of finished steels running slightly better than 70 pct there has been corresponding improvement in deliveries to consumers. Betterment in steel shipments also has been reflected in a step-up in manufacturing tempo and many plants that were forced to cut operations to 50 pct or less during the strike period are again back to prestrike activities.

Canadian Locomotive Works, Montreal, announced that the plant again is back on a 44-hr weekly operating basis after about 5 months of curtailed operations due to inadequate deliveries of steel. Numerous other companies, which were affected by the steel shortage since the middle of the year, now are operating close to the capacity mark.

While there has been considerable improvement in steel and pig iron deliveries since the first of October, there has been comparatively little easing in the supply situation. Steelmakers continue to carry big tonnage backlogs booked in the first

and second quarters and it is not expected that this old business will be cleaned off books before the end of the first quarter of next year. However, on sheets, plate and bars, mills are accepting new orders for second quarter delivery, but have no surplus capacity to the end of March.

Dominion Steel & Coal Co., Sydney, N. S., which was delayed in returning to full operations following the strike, again is back on normal schedules. Dominion Steel has just completed rolling a 8200-ton rail order for China and the first shipment on the export account since the end of the strike is on its way. The company also has resumed shipment of steel from Sydney to finishing mills in the Maritimes and central Canada.

Notwithstanding the shipment of steel rails to China, the Canadian Government continues to control exports of steel materials, although it is believed that as steel supply in Canada eases after the turn of the year there may be a lifting of the ban on exports by Dominion Steel & Coal Co. It is estimated that Great Britain would take upwards of 60 pct of the company's steel production of 900,000 tons a year.

Induction Heat Treated Cold-Finished Bars Now Made Available by J&L

Pittsburgh

••• The availability to the steel buying trade of induction heat treated cold finished and cold drawn bars was announced by Jones & Laughlin Steel Corp. Produced commercially for the first time, the induction heat treating process as applied to cold-finished bars is the result of experience gained by the company during the war in the practice of induction heat treating 105-mm and 8-in. shells. J&L was one of the largest producers of shells of these calibers. The use of induction heating in heat treating cold-finished bars, the subject of experiments for many months, has been deemed practicable and the sale of such bars should result in cost re-

ductions to fabricators who have heretofore had to do their own heat treating.

The installation of induction heating equipment at the company's Hazelwood cold-finishing mills makes possible the production for sale of hardened or hardened and tempered cold-finished bars that are claimed to be more uniform in quality than those heat treated by any other method used by the company.

Full-length cold-finished bars are fed by variable speed rolls through an induction coil that quickly brings them to quenching temperature. Immediately behind the coil, the bars pass through a water spray of controlled temperature and pressure that quenches the bar. Tempering is accomplished by passing the bars through another heating coil and quench spray, or by use of conventional tempering equipment.

Bars are to be sold in either the hardened condition or the hardened and tempered condition.

Jones & Laughlin Steel Corp. is equipped to furnish bars in cross-sections as great as 2-in., and wider size ranges will be available as demand dictates. American Iron & Steel Institute standard manufacturing tolerances for heat treated or strain relieved cold-finished bars and the company's rigid straightness requirements apply to this new product.

By the use of the induction heating process for heat treating cold-finished bars, experiments show that physical properties are improved and scaling is prevented by the speed and control of the process. Hardnesses approaching about 32 RC can be obtained and finished parts can be machined from the treated bar. Possible applications include studs, tie rods, bolts and shafting.

Humphrey to Receive Charles F. Rand Medal

Cleveland

••• George M. Humphrey, president of M. A. Hanna Co., and board chairman, Pittsburgh-Consolidation Coal Co., has been selected as the recipient of the Charles F. Rand Medal for 1947, according to announcement by Dr. A. B. Parsons, secretary of the American Institute of Mining and Metallurgical Engineers.



George M. Humphrey

The Rand Medal, honoring distinguished achievement in mining administration, has been presented to only two other men, Robert C. Stanley, board chairman, International Nickel Co., and Cornelius F. Kelley, board chairman, Anaconda Copper Mining Co.

Mr. Humphrey's citation for the medal is "for constructive leadership in establishing great enterprises for the production of iron ore, of steel, and of coal; for signal success in the administration of large organizations engaged in these basic industries so vital to the economy of our country."

Weekly Gallup Polls . . .

Strike Control Listed as First Problem for New Congress

Princeton, N. J.

••• John L. Lewis and other strike leaders have been staging their dramas before an audience which has become increasingly critical of everything that labor unions do.

The American people list strike control as the first problem which the new Congress should tackle when it convenes in January, according to George Gallup, director, American Institute of Public Opinion. Public desire for such legislation has been running strong for many months. As early as last January the voters named strike control legislation as the number one issue of the 1946 Congressional election campaign.

When the public was asked after the election Nov. 5, "What is the first problem you would like to see the new Congress take up?" the five problems named most often were as follows, with strike control named more than twice as frequently as any other issue.

- (1) Strikes
- (2) Prices and high cost of living.
- (3) Taxes
- (4) Housing
- (5) Shortages

Public sentiment for control of unions has persisted for many years. Before the war there was a growing demand for it, and during the war this demand was increased as a result of strikes in war industries.

Labor union leaders may be making the same mistake that prohibitionists did when public sentiment for repeal of the Eighteenth Amendment began to develop.

They concentrated attention on Congress and neglected public opinion.

They succeeded time after time in forestalling Congressional action on repeal. But they failed to sell their views effectively to the public. Yet the public gets its way in the long run—as the railroads, the trusts, and the utility holding companies and other groups discovered in the past in

attempting to resist public opinion when there were demands for government regulation.

In the coal controversy the issue is not simply whether John L. Lewis or President Truman shall be master. The issue is whether John L. Lewis or American public opinion shall be master.

Public opinion accepts unionism. There can be no doubt of that. So far as the public is concerned, collective bargaining is here to stay. But while John L. Lewis and the general public are in full agreement that there should be unions, the area of agreement does not extend much further than that.

The general public is not in agreement with Lewis and other labor leaders that union power should be extended to include the closed shop.

Public opinion surveys in the past have found that the general public does not accept the closed shop principle. One reason is that there is a deep distrust and dislike of monopoly in any form. The average American believes a man should be free to join a union if he chooses. But majority sentiment does not believe he should be compelled to join a union in order to get a job.

Public opinion has likewise never fully accepted the Wagner Labor Act. Polls taken in the past among voters with an opinion on the Act have never found a majority thinking it should be left on the statute books unchanged. Sentiment was always preponderantly in favor of repealing or revising the law.

Public dissatisfaction with union tactics is directed chiefly at strikes. The country was aroused as early as 1937 by the sit-down strikes, which won overwhelming public disapproval. When the war came, strikes in war industries further aroused public resentment. From 1941 onward polls by the institute found upwards of two-thirds of the voters in favor of prohibiting strikes in war plants.

Public desire for strike control

Public Sentiment is Divided On the Issue of Whether To Cut 1947 Federal Income Tax

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did not cool off when the war ended. As recently as May a poll found 64 pct in favor of prohibiting strikes in public utilities, such as gas, electric, telephone and local transportation companies, on the grounds that the unrestricted right to strike in such industries means the power to paralyze whole communities and to endanger public health and welfare.

Bernard Baruch, President Truman and others have suggested that labor and management agree to a moratorium on all strikes and lockouts for a period of 1 yr, in order to stimulate full production of goods. That suggestion has the backing of a majority of voters with opinions.

There is likewise wide support of the idea that whenever a labor dispute breaks out, unions would be required to wait for 30 days before any strike could start, with investigation of the issues during the cooling off period.

When President Truman last winter proposed cooling-off periods and fact-finding boards to help avoid strikes, 70 pct of union members polled by the institute were in favor of the proposal, at a time when union heads were denouncing it.

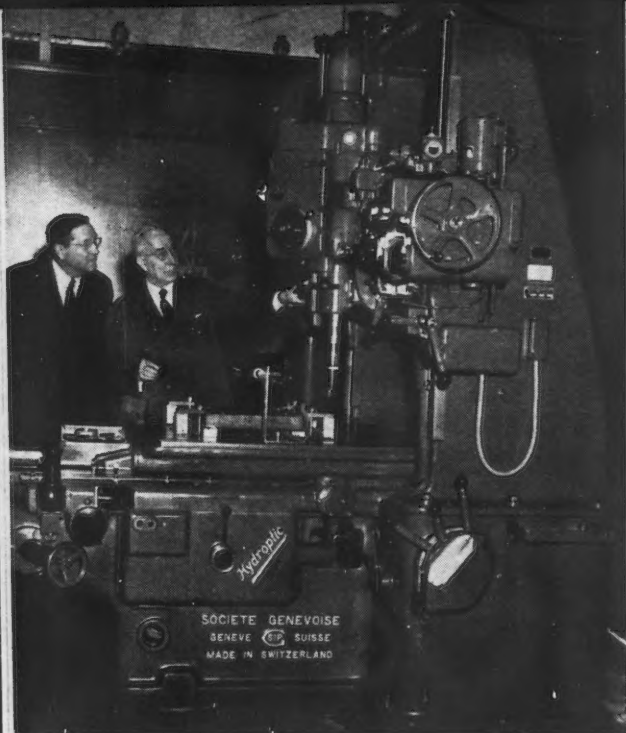
In the Nov. 5 election the state of Massachusetts held a referendum on the issue of requiring labor unions to file financial reports with state authorities. The proposition was carried by a 65 pct majority. This idea of making unions financially accountable has had nationwide popular backing for many years. One poll 2 yr ago found as many as 75 pct approving.

One union practice which is overwhelmingly criticized by the
(CONTINUED ON PAGE 156)

Motch & Merryweather Exhibit New Swiss Machine Tools

By W. A. LLOYD
Cleveland Regional
Editor

PRECISION JOB: A. H. Einig, right, general manager, Motch & Merryweather Co., points out some features of the Swiss jig borer to Harry Randall, one of his associates.



Cleveland

••• A selection of Swiss machine tools, including two jig borers manufactured by Societe Genevoise D'Instruments De Physique, Geneva, Switzerland, makers of the international scale, is being shown here by the Motch & Merryweather Machinery Co., distributors for the Cincinnati, Detroit, Pittsburgh and Cleveland areas.

Four other machines, a Universal profile projector and a shop gage measuring machine, both built by Societe Genevoise, a profile grinding machine manufactured by Fritz Stauder, Ltd., Glockenthal-Thun, Switzerland, and an automatic screw machine built by Andre Bechler, are also being shown.

The larger of the two jig borers, the "Hydroptic-B," features a two coordinate measuring system including built-in scales and optical settings by means of micrometer microscopes reading to 0.0001 in.

Working surface of the hydraulic table measures 39½ x 32 in, with longitudinal travel of 37½ in. Traverse travel of the spindle saddle is 28 in. The hydraulic table drive gives instantaneous feed variations and can be moved over its full stroke. The spindle runs in three special bearings and axial play is automatically compensated for.

Automatic feed rates are possible in either direction and in conjunction with 18 spindle feeds considerable flexibility is achieved.

Guaranteed accuracy for all settings of work table and spindle head is 0.0002 in. According to Societe Genevoise claims, this machine will perform depth machining operations, using a special depth measuring device, to plus or minus 0.00001 in. The "Hydroptic-B" can also be used for direct production.

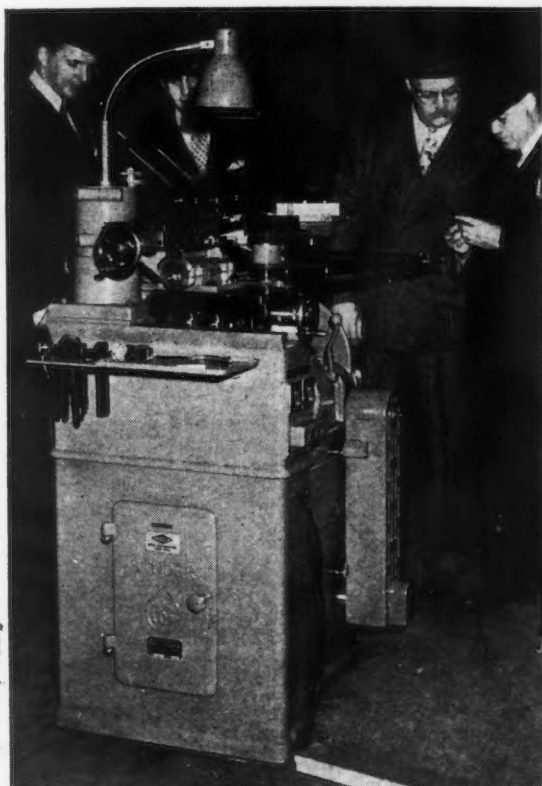
Workmanship on the machine is excellent throughout, even to the scraping of bearing surfaces. The spindle ways are scraped with a slight bow, to compensate for the weight of the head, all bearing surfaces are scraped so that there are 25 bearing spots per sq cm, or about 100 to a sq in. Base price of this jig borer is \$27,670.

PROFILER: An interested, but unidentified, group of spectators looking over a profile grinder particularly adapted to form tool work. This unit is a product of Fritz Stauder, Ltd.

The universal profile projector, also a product of Societe Genevoise, has a number of interesting features including an object table with rotary glass stage and cross slides fitted with micrometers for measurements in rectangular coordinates, surface projection of opaque objects in episcopic illumination, immediate changeover from one magnification to another, and direct measurements on the screen by means of glass scales and an adjustable protractor.

The projector magnifies 10, 20, 50 or 100 times, and illumination from below eliminates all shadow from the operator's hands or measuring instruments. The large screen permits objects to be projected full size.

Another Societe Genevoise product Motch & Merryweather are showing is a shop gage measuring machine which will handle plug gages, screw-thread gages, taps and screws, plain rings, snap gages, etc. Dimensions are gaged by re-



ording the displacement of the standard scale carried by the measuring carriage. Readings are made with micrometer microscope to 0.00005 in. and angles and thread profiles are measured with a gonio-metric microscope.

The profile grinding machine, a product of Fritz Stauder, Ltd., is of interest to manufacturers of carbide tools and companies where the tool rooms are required to do a good deal of form tool work, par-

ticularly circular form tools. An enlarged template of the work is directly before the operator, and the wheel and blower system are at the rear, giving relative freedom from dust. The operator merely follows the template with the appropriate finger or tracer, as the wheel is controlled by a pantagraph arrangement. Wheel dressing is performed with a special fixture, which holds the diamond, and by using an indicator, the wheel

is moved up to compensate for dressing, the grinder returned to the original set, and the grinding continues as before.

Machines similar to the Bechler automatic screw machine were built in the U. S. during the war for fuse work. The machine is somewhat slower than domestic machines of the same type, but has the advantage of a long spindle for tapered work. The head feeds with the material.

See Increasing Trend Toward Liquidation Of Emergency Controls

Washington

••• Accelerating what appears to be a movement toward early liquidation of emergency and wartime bureaus and the ending of regimentation of national economy, three more agency heads have resigned within a single week.

Quitting their government posts were OPA Administrator Paul Porter, CPA Administrator John R. Small and NHA Housing Expediter Wilson W. Wyatt.

It is not expected that successors will be named to succeed either Mr. Small or Mr. Porter. The CPA, remnants of OPA and other waning agencies will be consolidated under a single over-all liquidation agency. Plans for this are near completion, the White House said.

Resignation of Mr. Wyatt does not mean the end of the emergency housing program, however. David Krooth, an old hand in public housing and general counsel to NHA under Mr. Wyatt, has been named to head the agency. The White House said the emergency housing program is to be continued but from here on it must operate "within the framework of the government's policy of relaxing controls as soon as possible."

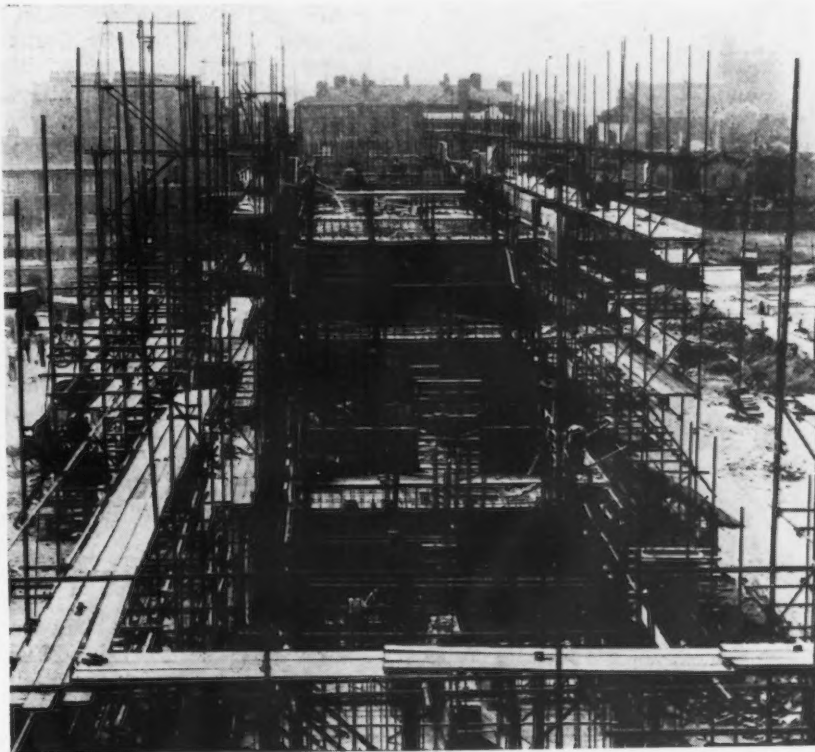
Mr. Porter has waged a determined fight to keep OPA intact and to continue the exercise of its controls until at least next spring. In his last official statement, however, Mr. Porter executed what amounted to an about-face in declaring that he is now convinced that the country is able to go it

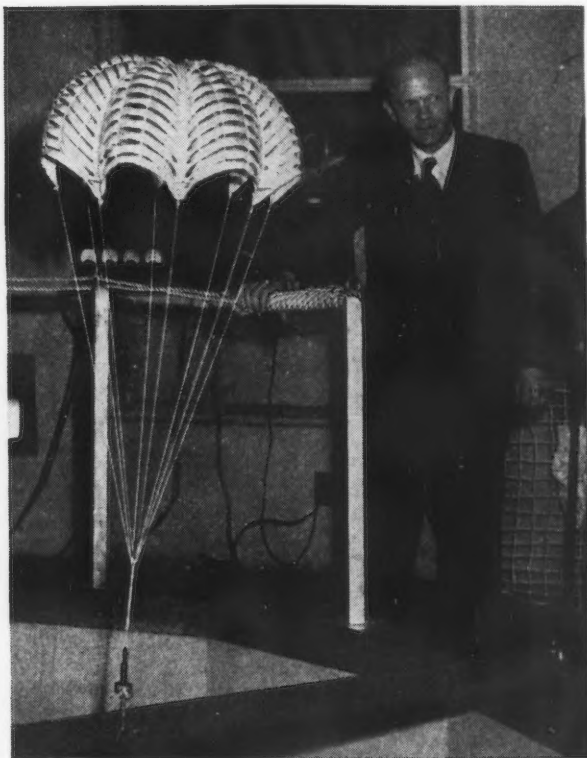
on its own and that there will now be "a general downward adjustment of prices as production rises."

In handing in his resignation, Mr. Small said that he believes the work of CPA is virtually completed. The CPA was set up as the successor to WPB to help speed up and stabilize the country's production during the transition from war to peace.

All three men are expected to return to private industry although the rumor here is that Mr. Truman will try to get Mr. Small to head the new liquidation agency. It is not generally expected that Mr. Small will accept since he has been increasingly anxious to get out of government service. He was formerly associated with the Publicker Corp. of Philadelphia.

MONOLITHIC CONCRETE: These four-story apartment buildings under construction in London use very few structural steel members. The huge project, covering 8 blocks and containing 233 apartments is built almost entirely of reinforced concrete. The mix is poured into forms made of sound resisting and insulating boards which form the face of the walls and prevent the sweating sometimes found in concrete buildings.





SAFETY 'CHUTE:

Dr. Helmut Heinrich of the Graf Zeppelin Research Institute, Stuttgart, pictured with a ribbon type parachute which he perfected. He and 85 other German scientists are working for the United States in advancing our scientific frontiers.

Dayton

• • • While U. S. Army Air Force planes buzz peacefully overhead, 86 scientists who were leaders in their specialties in Germany and Austria during World War II are working here at Wright Field, headquarters of the Air Materiel Command, assisting AMC personnel in research programs which will pioneer the promised age of flight.

The German scientists work under special contracts as alien civilian employees of the War Dept. They entered into the contracts voluntarily.

First of the group to be used at Wright Field arrived on Sept. 26, 1945, but their arrival was not disclosed at that time because of the danger of reprisals on their families; the same consideration prevented disclosure of the subsequent arrival and activities of other scientists.

Salaries of the German scientists range from \$2.20 to \$11 a day and are paid to the scientists banks or families. While on temporary duty in the U. S. they are paid an additional \$6 per diem to cover living expenses. Their living quarters are comparable to those of junior officers of the U. S. Army. After duty hours, the scientists are allowed to leave the post un-

escorted provided they sign out and in at the gate and remain within the area served by municipal transportation facilities and provided that they do not remain away from the post overnight. A few members of the group have relatives in the vicinity.

Some indication of the high mental caliber of the group can be had from the fact that Dr. Bernard Goethert, formerly chief of high speed aerodynamic section at DVL, Berlin-Aldershof, is presently engaged in testing and correcting the Wright Field 10-ft wind tunnel, and Fritz Dolhoff, who invented and designed the Dolhoff jet propelled helicopter which is one of the oddest projects at Wright Field at the moment, is also a member of the group.

Dolhoff's helicopter, which may contribute substantially to the development of rotor blade aircraft, is so designed that rotor blades are revolved by the exhaust from a jet engine, piped to the blade terminals. In this way, the helicopter can hover or go up and down. Forward speed is attained by tipping the tail elevators.

A pusher-propeller at the rear of the fuselage provides a slip stream allowing easier directional control. This is powered by a small motor which is carried in

Army Reveals Research Activities Of German Scientists In America

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addition to the jet engines, but neither engine directly propels the ship.

The helicopter, which has been designated the V-4, cruises at speeds up to 25 mph. Experts believe, however, that this speed can be greatly increased by addition of another propeller to provide forward thrust and experiments are now being conducted along these lines.

Another project on which some of the German scientists are collaborating is the ribbon parachute, one of a number of solutions to high speed bail-out. Developed by a large staff of German scientists and originally built by a manufacturer of hat bands, the ribbon parachute was put into production for use in all German Air Force jet planes shortly before the end of the war.

Possessing the advantage of low opening shock and descent without oscillation, the ribbon parachute enables fighter pilots to pull off extraordinary diving maneuvers, and one such chute attached to each wing will stop a spin or slow a plane enough to eliminate danger to the pilot bailing out.

The ribbon parachute works as follows: When the ripcord is pulled the pilot chute springs from the pack and fills, drawing the canopy and lines from the pack enclosed in a fabric sleeve. Lines are stowed on an auxiliary panel at the skirt in such a manner that the canopy portion of the chute is trapped until the last foot of lines is withdrawn. The canopy is constructed of 144 ribbons which start at the skirt and extend upward at a slight angle to a point tangent to the vent diameter of 20 in which causes a progressive decrease of the air spaces between ribbons until at a point about 3 ft from the vent a solid coverage of ribbons is attained.

Some of the scientists have completed their work at Wright Field and are now waiting to find out if

they will be permitted to stay in the United States and find employment in industry. Dr. Eugen Ryschkewitsch, a specialist in high temperature ceramics, carbides, graphites and boron is typical of these.

Dr. Ryschkewitsch, who spent his last years in Germany in research activities, has developed a number of special materials including a sintered ruby material which was used to some extent in Germany in the last days of the war. Sintered at a temperature slightly below 2000 °C (3632°F) the sintered ruby material when used for dressing grinding wheels will, it is said, give results closely approaching diamonds. The material can be extruded, pressed, in a variety of shapes before firing, and is 5 to 10 pct harder than aluminum oxide or corundum, according to the German scientist.

Dr. Ryschkewitsch, who invented a special furnace for firing at high temperatures, believes the ceramics industry has a tremendous future. The sintered ruby material, according to him, possesses some physical properties which are superior to the carbides,



OPERATION PAPERCLIP: The name given to the Air Force project at Wright Field naturally gave no tip that included in its scope was experimental work on this jet powered helicopter. Dr. Freidrich Doblhoff, its inventor, is at the controls of the whirling blowtorch.

and despite the high cost of firing, is, he asserts, infinitely cheaper.

Ernst Eugel, a specialist in designing heavy machinery for rolling mills and hydroelectric presses, visited the U. S. a number of times prior to World War II. While his former company, Alfred Schloe-

mann, built special equipment for a number of large companies here, Mr. Eugel regards the American development of cold-rolling as astonishing, and predicts that more and more material, including carbides and all light metals, will be cold-rolled in increasing quantities.

Army-Generated European Scrap Will Soon Be Available to U. S. Buyers

Washington

••• Army-generated scrap located in Europe will be available to American buyers for shipment to the United States within a few weeks, it was learned last week.

This change in policy was directed by the Office of War Mobilization in an attempt to ease the domestic scrap shortage. Previously American interests could buy scrap in Europe, but could not ship it to this country. Only small quantities have been returned to date, primarily as ship ballast.

This new program covers ferrous and non-ferrous scrap. Estimates on the quantities of ferrous scrap available are not firm. However, it is expected that about 100,000 tons will be available within a short time and 200,000 to 300,000 tons can be had within two to three years.

Army-generated scrap includes wrecked vehicles and other debris of war, but does not cover enemy equipment. Nor does it include scrap from wrecked European buildings and other structures. This latter scrap is being sold in Europe, and in some cases military government officials are exchanging it with other nations for material needed to rehabilitate Germany.

All sales will be handled by Army commanders on the spot, and transportation will have to be arranged by the American buyers. Competitive bidding will be utilized, as well as negotiated sales.

It is reported that while buyers from all countries will be given a chance at the available scrap, Army officers will be instructed to give American business preference in sales, so long as acceptance of

American bids will not entail substantial loss to the Army.

Army officers told THE IRON AGE that orders to European commanders authorizing this program would be dispatched sometime this week.

The directive ordering the Army to begin such sales was delivered to Army officials on Dec. 6. It was signed by Harold Stein, OWMR Deputy Director. About a year ago, Mr. Stein, overriding a report on European scrap prepared by a committee headed by Robert W. Wolcott, Pres., Lukens Steel Co., recommended that scrap be left in Europe.

Canadian Nickel Declines

Ottawa

••• Output of nickel in September at 15,960,785 lb compares with 15,437,106 lb in August and 16,506,248 lb in September 1945. For the nine months of this year output of nickel totaled 137,991,117 lb compared with 198,191,362 lb in the same period of 1945.

Predicts Greater Output, New Developments in Powder Metallurgy

Cleveland

• • • Greater production of metal powders by the industry and a new development by Metals Refining Co., a division of the Glidden Company, were predicted here by Joseph Drapeau, technical director of the company's metal powder "pilot" plant at Hammond, Ind.

Mr. Drapeau, here for a 3-day conference of Glidden Co., research and technical executives, refused to elaborate on the nature of the new development, full effect of which will not be felt in the powdered metals field for 6 months or a year.

He acknowledged, however, that development of an alloy powder for use in the electro-magnetic field is one of the principal objectives of the industry at the present time.

He hinted that the Glidden Co. may build a bigger plant following additional research in the metal powder field and as the advantages of powder metallurgy in speed and economy of production are more widely recognized.

The powdered metal industry has considerable competition from overseas but availability of prepared ores, including taconite, if benefited, would help the industry in this country. Until 1941, practically all the iron powder used in the U. S. was imported from Sweden.

The trend toward more output

of more powdered metal parts of greater strength is being supplemented by considerable development work, particularly in the electrical field, Mr. Drapeau said. Metals which cannot be alloyed in the molten state, such as iron-lead, tungsten silver, etc., can be combined by powder metallurgy.

Although powdered metal sections cannot be made less than $\frac{1}{8}$ -in. thick at present, Mr. Drapeau believes that with development of new powders, presses and pressing techniques this limitation can be overcome.

Mr. Drapeau joined the widely diversified Glidden Co. when he sold smoke to W. J. O'Brien, vice president and chairman of the company's manufacturing, research and development committee, as a raw material for the production of lithopone. Mr. Drapeau,

then metallurgist for Nichols Copper Co., a division of Phelps-Dodge Corp., collected 40,000 lb of smoke a day in the form of dust and sold it to the chemical and pigment division of the Glidden Co.

Greater knowledge of the end use of metal powders in industrial and consumer products is a major aim of the powdered metals industry, Mr. Drapeau said. Applications of metal powders already are numerous but the experts, including Mr. Drapeau, feel the surface has merely been scratched.

Powdered metals now are used in cemented carbides, sintered iron parts, self-lubricating bearings, the refractory metals, alnico magnets and specialized electrical contacts.

Metals Refining Co. uses the hydrogen reduction process to reduce the selected metal scale or iron oxides to powders. By adding copper up to 10 pct to some iron powders, the company greatly improves the physical properties of the powder.

Requirement to File Reports of Change in Prices Now Revoked

Washington

• • • Assurance that they are completely relieved of the job of reporting price changes on decontrolled commodities and services has been given by OPA to businessmen. This pleasing information was announced by the severe-

ly shrunken pricing agency because, through misunderstanding or lack of information, many businessmen have continued to report to OPA all price changes on various decontrolled commodities or services upon which they had previously been required to file such reports. The former requirement for reporting price changes was revoked effective Nov. 19.

An important rule that still remains in effect, however, is that all producers, processors, distributors and other sellers of any commodity under price controls are required to keep on hand for a year after date of decontrol of the commodity, all records, reports and other documents that they were required to maintain to the time of decontrol.

Also, OPA has pointed out in answer to queries from industry, past violators are still subject to suit. This legal authority has been upheld by the Supreme Court, the agency said, in a case which held that, since penalties for violation have root in the statute and not in the regulation, revocation of a regulation does not prevent an indictment for violation of its provisions at a time when it was in force.

Coming Events

- Dec. 16-18 American Society of Refrigerating Engineers, annual meeting, New York.
- Jan. 6-8 Institute of Scrap Iron & Steel, Inc., convention, New York.
- Jan. 27-31 Electrical Engineering Exposition, New York.
- Jan. 27-31 International Heating and Ventilating Exposition, Cleveland.
- Jan. 28-Feb. 2 Society of Plastics Engineers, exhibition, Chicago.
- Mar. 17 American Institute of Mining & Metallurgical Engineers, world conference on mineral resources, New York.
- Mar. 17-19 American Society of Lubrication Engineers, annual meeting, Pittsburgh.
- Mar. 22 Western Metal Conference and Exposition, American Society for Metals, San Francisco.
- Apr. 29-May 1 Industrial Packaging and Materials Handling Exposition, Industrial Packaging Engineers Assn. of America, Chicago.

The London **ECONOMIST**

Reason and Russia

THE world has had a surfeit of statesmen's speeches in recent days. Truman and Byrnes, Attlee and Bevin, Stalin and Molotov have all had their say. It can hardly be said that the feast of oratory has changed the aspect of the world's consuming problem. Indeed, the issue has been sharpened, for on both sides the last attempt to hide the fact that the Great Powers are at odds has broken down, and the stage of mutual abuse in public has been reached.

There is no reason to doubt that large majorities both of the American and of the British public stand behind their official spokesmen. But in both countries there is a deeply indignant minority—and perhaps a larger number of citizens who are very troubled in their minds at the drift of events.

As always when there is a hot controversy afoot, the issue tends to be presented as an inescapable choice between extremes, both of which are unacceptable. The ranks are indeed forming up. On the one side are those who would accord to Russian motives and actions an indulgence they would never dream of according to their own country. On the other side are those who see in every Russian move a deliberate preparation for aggression.

In this growing tumult the voice of cool reason is getting dimmer and dimmer. The reasonable man, as usual, can see a great deal in both sides of the argument. It is unlikely, for example, that any citizen of the Western democracies who can distinguish evidence from propaganda has any illusions left about the nature of the Soviet state. Internally, it is a brutal and conscienceless tyranny, whose exploitation of the individual is in no way excused by the fact that it is done under the banner of Marxian socialism. Externally, it appears to have neither scruples nor ideals.

The Soviet leaders ran away from Hitler for as long as they

could and joined in the anti-Fascist crusade only when they had to. The fable that their boorish aggressiveness now that they are on top can be explained and excused by the deep suspicions of the West that they have inherited from revolutionary days—a fable that many people in the West have tried hard to believe, against their better judgment—can be believed no longer.

The picture of the men in the Kremlin as so hag-ridden by nameless fears that they cannot think straight is ludicrous; the evidence is that they are very cool calculators, well in control of their own emotions. Russian policy, on the showing it has made to date, is power politics, out to get what it can for the price it is willing to pay, and determined to exploit to the full the advantages that a dictatorship always has over democracies in the war of nerves.

IT has become difficult over recent months for any open-minded and reasonable man in the Western countries to resist the evidence that establishes these contentions. But they do not add up to the inevitability of war, certainly not in the foreseeable future. They do not even add up to the impossibility of a fruitful collaboration with Soviet Russia. It is true that the perfect harmony that inspired the dream of the United Nations is impossible; but it ought to be possible to establish relations on such a basis that the practical business of international affairs can be transacted.

It may be that a world, like a nation, cannot endure, permanently, half slave and half free; but it can so endure a long time, during which the Russian people may be liberated. It is possible that the Russian expansionism of the last few years will be unable to stop, like Hitler's ambition before it. But if it follows the pattern of Russian history, the tide will ebb and Russia's attention will turn back inwards upon itself.

Reprinted by special permission to further understanding on how political and economic affairs are viewed in London.

o o o

And perhaps the chief reason for refusing to take the melodramatic view, at least for a decade or two, is that Russia is by no means as strong as the current imagination of the world supposes. The war that the Soviets were called upon to fight in 1941 was the sort of war at which the Russians excel, a defensive land war in their own country. They would not be nearly so strong in a war that had to be fought at a distance, and on three elements.

The chief buttress of peace at the moment is the much abused balance of power, which is strongly against Russia, and will remain so, unless Western carelessness allows the atomic bomb to get on to the wrong side. The reasonable attitude for the liberal-minded Westerner to adopt towards Russia is one of dislike and even of distrust, but neither of fear nor of hostility.

If this is so, the problem of relations with Russia becomes simply that of estimating what attitude on the part of the Western nations will most quickly maneuver them and Russia into a posture of agreement—not of perfect fraternity but of willingness to do business. If the policy is to have a chance of success, it must be thought out coolly and rationally on the basis of the evidence, without the irruption of any emotion, as dispassionately as a psychiatrist approaches a difficult case. The only valid test of a policy is whether it would work.

What, on the evidence, would be the probable effect of a Wallace policy of seeking out concessions that could be made to the

(CONTINUED ON PAGE 153)

The NAM Announces a New Liberal Labor Program

New York

••• Taking a stand against the forces of reaction, the National Association of Manufacturers appears to have reversed its former position in adopting a new liberal labor policy. The keynote of the new approach was sounded by Clarence B. Randall, chairman of the industrial relations program of the association and vice president of Inland Steel Co., at the association's 51st annual congress held last week.

Some 1800 industrialists, meeting in New York, also heard warnings on interpretation of the election and statements on the future outlook for the steel, machine tool and other industries.

"We shall not propose to the American people a specific program of legislation," Mr. Randall said. "We do not seek a labor policy that shall serve the special interests of manufacturers. We ask only that there shall be a Federal labor policy so conceived and so executed that the well-being of all the people will best be served." Right now, he said, the country has no labor policy at all.

In the keynote speech of the 3-day convention Walter B. Weisenburger, NAM executive vice president, warned members that

"we must always remember the election signifies that the people want to return to the spirit of constructive liberalism; in no sense was it intended to place the forces of reaction in power." This trend, he warned, is not necessarily a permanent one. "The election is no assurance that the people will not turn again to government if other means of leadership fail."

Tossing aside various methods conceived to preserve the status quo, Mr. Weisenburger suggested a new approach to the problem of selling the NAM to the public as an organization which believes that industry and the country's welfare must move forward together. "Business," he asserted, "can capture the leadership of public opinion only if it makes, and dramatizes, a conscientious and determined effort to solve the nation's legitimate economic problems when they exist."

The delegates also heard J. Howard Pew, president, Sun Oil Co., and NAM director, pay tribute to the association's public relations staff for arousing the public to a consciousness of the dangers inherent in OPA controls. The credit for swinging the weight of public opinion against OPA in a matter of 7 months be-

longs in very large part, Mr. Pew said, to the NAM public relations staff.

A number of the delegates indicated that it was indeed refreshing to hear a Government spokesman, in the person of Secretary of Commerce W. Averell Harriman, publicly express his awareness of the labor-management problem. This problem, Mr. Harriman declared, is certainly one of the most serious facing the country today. "The power of labor leaders," he continued, "has grown to a point where we find one man defying the government and the nation. It seems evident that in the coming session of Congress measures will be proposed with the objective of clarifying the relationship between the rights of labor unions in representing their members and their responsibility to the public."

Mr. Harriman made it clear that, in his opinion, the problem of preventing inflationary price increases is one in which labor has a major responsibility. Labor can contribute to the avoidance of a further spiral in prices and eventually gain a firm increase in real wages if it will show restraint now in its wage demands, he said. By the same token, he added, "the public has the right to expect that management will adopt pricing policies based on long range consideration and not immediate profit."

The coming year promises healthy prosperity for America unless prospects are dimmed by strikes that tie up production or spiraling wage scales that force prices out of consumers' reach.

The foregoing paragraph summarizes the 1947 production outlook as outlined to the convention by spokesmen for the steel and machine tool industries. Charles R. Hook, president, American Rolling Mill Co., and Robert M. Gaylord, president, Ingersoll Milling Machine Co., were the spokesmen.

Mr. Hook said the need for steel indicates that the industry's capacity will be fully occupied through 1947 at least. "While the steel industry has the markets that need its products and users

NEW UNDERSECRETARY: William C. Foster, former metalworking plant executive, takes the oath of office as Undersecretary of Commerce. W. Averell Harriman, his new chief, left, is administering the oath. Mr. Harriman last week told the NAM that the labor-management problem was one of the most serious questions facing the people of this country today.



have the ability to pay, what can prevent utilization of its facilities in full?" Mr. Hook asked. "As I see it, there are two closely interwoven factors that might affect steel production.

"First, there is a possibility that production of steel will be curtailed by strikes, which may be called because of inability to reach an agreement on wages. Second, if wages are increased without a corresponding increase in production per manhour, costs will increase and necessarily selling prices will advance. . . . Unreasonable demands will play havoc in spite of the most urgent need for steel."

Mr. Gaylord reported that, by and large, the machine tool industry can be said to be in good position. "It has a reasonable backlog of unfilled orders, and a great

opportunity in the offing—the opportunity to build for the potential market," he stated.

"The immense purchases of mechanical equipment during the war did not modernize our peacetime production facilities. . . . Fifty-four pct of all the machine tool equipment in private hands is over ten years of age. New tools can do the work done by the great majority of this 54 pct at an estimated minimum saving of 15 pct on the investment cost."

Mr. Gaylord suggested that industry adopt the policy of spending depreciation reserves every year as an antidote for "boom and bust" cycles. Current production in the machine tool industry is approximately 40 pct greater than before the war, and somewhat less than a quarter of peak production, Mr. Gaylord estimated.

CPA Halts Priorities On Iron and Steel Items Despite End of Strike

Washington

• • • Issuance of priorities on iron and steel was halted by CPA, effective Dec. 9, due to the drop in production occasioned by the coal strike. This action, forecast by THE IRON AGE, Dec. 5, p. 127, also included an immediate cutback on merchant pig iron preference ratings for December delivery, permission to steel warehouses to reject steel orders (rated or unrated) of more than 10,000 lbs in any one product classification, and the establishment of a ceiling of 25 pct of production on rated orders which mills must accept after Dec. 31.

While CPA termed these actions temporary measures, it is not likely that there will be a return to priorities on a large scale, except possibly for housing, despite the end of the coal strike.

Steel priorities outstanding—which are principally for the military services, special housing products, urgent export needs and for the special assistance provided to small businesses in PR-28—amount to only about 10 pct of over-all normal steel production, CPA said. However, priorities for individual critical products, such as light gauge sheet steel, amount to 40 to 50 pct of production of some mills. The action being taken

will drastically curtail the percentage of these rated orders.

The announcement, as it applies to pig iron, became effective Dec. 6, through the issuance of Dir. 15 to order M-21. Because certifications and directives for pig iron to be delivered in December were issued on the basis of normal production, this direction provides that CPA may issue individual directives to producers permitting them to reduce the amount of mer-

chant pig iron which they have scheduled for delivery during December on certified orders. Such reductions will be computed so as to distribute the anticipated loss in overall production equitably between rated and unrated orders.

Auto Replacement Parts Output Double 1941 Rate

Detroit

• • • Statistics released by Automobile Manufacturers Assn. indicate that the volume of replacement parts produced during the first 8 months aggregated \$1,080,000,000 or more than double the dollar volume for the corresponding period of 1941 when \$449,000,000 worth of replacement items were produced.

The increased rate of manufacture of replacement parts is in sharp contrast to the new automobile assembly rate and has been achieved despite strikes and raw material shortages which have hobbled new car output, according to George Romney, general manager of AMA.

A recent survey shows that automobiles on the road today have an average age of 8½ yr, Romney said, and the automobile manufacturer has clearly recognized the motorists' plight in trying to keep his car in operation.

RECONVERSION: The former Navy assault cargo ship *Gadsden* has been refitted to handle locomotives weighing up to 125 tons. For this, her maiden voyage, she loaded a cargo of 13 Baldwin locomotives for France. Forty-five locomotives and their tenders are visible in the picture.



Industrial Briefs...

• **DIVERSIFIED PRODUCTS**—Globe Wernicke Co. of Cincinnati, has added a new line of products. In addition to their office furniture and supply line, they are making refrigerator locker units and a new type of sectional display for outfitting retail auto accessory stores.

• **MORE CORTEN** — The Sharon Steel Corp. has been licensed by the U. S. Steel Corp. to produce Corten. This grade of steel is in heavy demand by the railroad car builders and is required for the most part in flat-rolled products. Republic Steel Corp. is also a licensed producer of this grade.

• **DIESEL PLANT**—Plans to construct additional facilities at the Beloit Works of Fairbanks, Morse & Co. for the manufacture of railway diesel-electric locomotives, were announced. Erection of the new building which will be 163 ft wide and 703 ft long, has been approved by the CPA.

• **NEW TUBEMILL**—Electroweld Steel Corp. has purchased four acres of industrial property on the Santa Fe Railroad located in Azusa, Calif. The first tubemill is now installed and test runs are being made. The building contracts and craneways have been let with a Los Angeles contractor. The company expects to be in production on mechanical steel tubing by Jan. 1.

• **VACANT PLANT BOUGHT**—Eagle-Picher Co., Cincinnati, which operates mines in Missouri, Oklahoma and Kansas, producer of lead and zinc oxide, has purchased the vacant oxide processing plant of International Smelting & Refining Co. at 151st St. in East Chicago, Ind.

• **NEW FORGER**—England Forge Co., a newly organized firm, is constructing a new building in Franklin Park, Chicago, where they will manufacture a general line of small forge items.

• **HUPP EXPANDS**—Hupp Corp. has acquired the capital stock of Amgears, Inc., Chicago, and thus now owns the land and properties of American Gear & Mfg. Co. Operations will be consolidated at the American Gear & Mfg. plant at 6633 W. 65th St. William S. Knudsen is now chairman of Hupp Corp.

• **STEEL SERVICE**—Construction of modern and complete steel supply servicing facilities for industry on the Pacific Coast has been started by the Caine Steel Co. of California on its new quarter million dollar steel warehouse and service center at 65th and Hollis St., Emeryville, Calif.

• **WORK COMPLETED**—The Indar Corp., Indianapolis, has announced complete facilities for producing powder metallurgical parts for ferrous and nonferrous materials, such as porous bearings, structural parts, iron parts, soft magnetic materials and high frequency iron cores.

• **ANNOUNCES SALE**—WAA has announced the sale of a surplus machinery and machine tool manufacturing facility to the Cross Co., for \$175,000. The facilities involved adjoined the Cross Co. plant on Bellevue Ave., Detroit, and the sale included a number of electric installations in the buildings owned by the firm.

• **OPENS PLANT** — Southern Foundries, Nashville, Tenn., is opening a plant at Bessemer, Ala. The new plant will occupy a part of the property of the old Central Foundry Co. at Bessemer.

• **CONSOLIDATES PLANTS**—The Olofsson Tool & Die Co. of Lansing, Mich., has just completed, ready for occupancy, a new plant that will house under one roof the operations of its two former plants. Floor space totals approximately 30,000 sq ft and the new site comprises 21 acres of land.

Union Sues U. S. Steel Asking for \$120 Million In Walking-Time Pay

Pittsburgh

• • • The USWA-CIO is seeking \$120 million from U. S. Steel Corp. for back "portal-to-portal" pay and damages dating from Oct. 24, 1938, instituting the suit against Carnegie-Illinois Steel Corp. and National Tube Co. The suit was filed in behalf of 90,000 employees of Carnegie-Illinois and 30,000 employees of the National Tube Co.

The claim for \$120 million is based on an average 20-min. travel time for each of the two companies' hourly rated employees, and the union asks that a jury determine the total time. The suits are based on the decision of the Supreme Court against the Mt. Clemens Pottery Co. in June.

The suits asserted that employees of the two companies were required to spend considerable time on the premises of the companies before and after regular working hours. Compensation at time and a half rates for this time is asked.

Specifically, the suit requests: (1) That the plaintiffs and all those for whom the USWA-CIO brings the suit are entitled to recover; (2) that the court further determine the amount due for labor performed and time spent by each employee; (3) that a judgment for the amounts be entered against the firms; (4) that an equal, additional amount be entered as liquid damages; (5) that the court place the costs of the case and the attorney's fees on the defendants; (6) that such other relief as is just be granted the plaintiffs.

Knickerbocker New Chief

Washington

R. G. Knickerbocker, formerly Chief of the Metallurgical Branch of the Bureau of Mines, Washington, D. C., has been transferred to the position of Chief of the Rolla, Mo., Division of the Metallurgical Branch. Oliver C. Ralston, formerly Assistant Chief of the Metallurgical Branch in Washington, has been promoted to the position of Chief.

Construction Steel...

...Fabricated steel awards this week included the following:

- 3000 Tons, Sunbury, Pa., Pennsylvania Power & Light Co., steam-electric station, to Bethlehem Steel Co., Bethlehem, Pa.
- 2450 Tons, Fort Peck, Mont., surge tanks, etc., for Fort Peck Powerhouse, U. S. Engineer Office Ser. 24-016-46-33, to Chicago Bridge & Iron Co., Chicago.
- 1500 Tons, Long Beach, Calif., girder rails for trackage on Pier B, Long Beach Harbor, Spec. #HD, 220-A, to Bethlehem Steel Co., Bethlehem, Pa.
- 650 Tons, Buffalo, plant additional for National Gypsum Co. at Clarence, N. Y., through Siegfried Construction Co. to Ernest Construction Corp.
- 500 Tons, Pomona, Calif., Frenstrom paper mill addition, to Pacific Iron & Steel Co., Los Angeles.
- 310 Tons, La Porte, Ind., building for Allis Chalmers Mfg. Co. to American Bridge Co., Pittsburgh.
- 200 Tons, Kurtz, N. D., highway underpass to Clyde Coman.
- 150 Tons, Portland, steel tank for Bureau of Water Works, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

...Fabricated steel inquiries this week included the following:

- 6500 Tons, Sewaren, N. J., power station, Public Service Electric & Light Co.
- 1960 Tons, Billings, Mont., transmission towers, Montana Power Co.
- 1000 Tons, Huron, Ohio, bridge. Bids to be asked for shortly.
- 900 Tons, Indianapolis, addition to telephone building, Leslie Colvin, contractor.
- 670 Tons, Rutherford, N. J., New Jersey Dept. of Highways, bridges, Eldorer Construction Co., Rutherford, N. J., low bidder.
- 500 Tons, Philadelphia, E. I. du Pont de Nemours, laboratory building, Dec. 12.
- 500 Tons, Shasta, Calif., Coffey Dam at Shasta, U. S. Bureau of Reclamation.
- 475 Tons, Stratford, Iowa, continuous beam girder bridge, State of Iowa.
- 400 Tons, San Antonio, Tex., buildings, San Antonio Transit Co.
- 400 Tons, Russel, Ky., alterations and additions to C&O shops, Hughes Foulkrod Co., bids in.
- 350 Tons, Saginaw, Mich., fertilizer plant for Farm Bureau Service.
- 250 Tons, Farmington, N. M., beam bridge for the new Mexican highway.
- 185 Tons, Odair, Wash., machine shop, U. S. Bureau of Reclamation.
- 121 Tons, Long Beach, Calif., tapered steel casing, Port Manager, Long Beach, bids opened Dec. 6.
- Unstated tonnage, Waynesboro, Va., office building and research laboratory for E. I. du Pont de Nemours Co., Dec. 16.

...Reinforcing bar awards this week included the following:

- 485 Tons, Weber Co., Utah, state highway bridge, State Road Commission (UI-314), to Bethlehem Pacific Coast Steel Corp., San Francisco.
- 305 Tons, Oakland, Calif., Orinda filter plant extension, to Judson-Pacific-Murphy Corp. San Francisco.
- 300 Tons, San Diego, Mission Valley bridge, to Soule Steel Co., San Francisco.
- 265 Tons, Northport, Wash., Columbia River bridge and Great Northern overcrossing, to Bethlehem Steel Co., Bethlehem, Pa.
- 200 Tons, San Bernardino, Calif., City Creek Bridge, to Blue Diamond Corp., Los Angeles.
- 180 Tons, Los Angeles, overcrossing, Santa Ana Parkway at Lorena St., to Blue Diamond Corp., Los Angeles.
- 120 Tons, Pomona, Calif., Frenstrom paper mill addition, to Stover Bros., Inc.
- 110 Tons, Oceanside, Calif., San Luis Rey

River bridge and Keys Canyon bridge, to Bethlehem Pacific Coast Steel Corp., San Francisco.

- 105 Tons, Santa Barbara Co., Calif., two bridges between Hollister Wye and Fairville Ave., to Bethlehem Steel Co., Bethlehem, Pa.

- 100 Tons, Minden, Nev., structure on U. S. 395 between Minden and Tahoe-Douglas Airport, to Martin Iron Works, Los Angeles.

...Reinforcing bar inquiries this week included the following:

- 3610 Tons, Granby, Col., construction of Granby Pumping Plant, Bureau of Reclamation, Denver, Spec. 1585, to Jan. 22.
- 2650 Tons, Estes Park, Col., Marys Lake power plant, etc., Bureau of Reclamation, Denver, Spec. 1570, to Jan. 15.
- 600 Tons, Huron, Ohio, bridge. Bids to be asked for shortly.
- 450 Tons, Urbana, Ill., for women's dormi-

tory at University of Illinois. Bids were made last week but not yet awarded.

...Sheet piling awards this week included the following:

- 200 Tons, Northport, Wash., Columbia River bridge and Great Northern overcrossing, to Columbia Steel Co., San Francisco.

...Plate awards this week included the following:

- 900 Tons, Sacramento, Calif., construction of water mains, to Western Pipe & Steel Co., San Francisco.

...Pipe awards this week included the following:

- 1325 Tons, Hillsboro, Ore., steel pipe and couplings, to Beal Pipe & Tank Co., Portland, Ore.

...Railroad car awards this week included the following:

- Missouri Pacific has placed orders for 1350 new freight cars with the American Car & Foundry Co. and the Pressed Steel Co.

Renewed Drive to Pass Wagner-Ellender-Taft Housing Bill Expected

Washington

...A renewed drive will be made in the new Congress to bring about the passage of the Wagner-Ellender-Taft housing bill. It is reported that it will be reintroduced early in the session.

Among major provisions of the measure are those which are intended to stimulate construction of rental housing, the absence of which is held to be one of the serious defects of the housing program over the past year.

White House support of the Wagner-Ellender-Taft bill or its counterpart was pledged by President Truman in his statement accepting the resignation of Wilson W. Wyatt as Housing Expediter.

Mr. Truman has plainly written off the emergency status of the housing program. Mr. Wyatt had sought reaffirmation of the emergency rating of the program and White House backing in his fight to force big loans from a reluctant RFC to builders of prefabricated homes. Neither was granted.

On the other hand, the President said that with a million homes placed under construction and prospect of 700,000 completed in 1946, the "remainder of the program must now be faced within the framework of the government's announced policy of relaxing controls."

The President went on to say

that production of building materials had increased until some were being produced at the highest levels in history and that now the housing program must be geared into the entire economy so as to prevent distortions which in turn would create new emergencies in other fields.

There had been growing criticism of the methods of Mr. Wyatt which, it was claimed, ignored other civilian needs in issuing set-aside and other orders regardless of probable effects on other phases of the national economy. Indirectly, by refusing to support the Housing Expediter's demand for continued broad powers to bring other agencies and industry into line, the Administration expressed displeasure of these methods.

"Balance of materials and equipment must be achieved," Mr. Truman declared. "The program must be given its proper emphasis in the overall economy and controls must be relaxed as rapidly as possible without threatening the success of the housing program."

No major modification of the housing program is indicated for the immediate future, however. With regard to factory-built housing, government loans and guaranteed market contracts will be continued as provided in the housing act. It is evident, however, that in making such contracts a great deal more deference will be paid RFC than in the past. It is certain, too, that more attention will be given to the effect housing contracts may have upon the entire economy.

MACHINE TOOLS

... News and Market Activities

Industry Concerned Over New Tooling Delay

••• Two developments, an increase in the price of pig iron and hold-ups on new tooling orders from the automobile companies, are contributing their share to the machine tool industry's present unhappy plight.

The pig iron price increase will automatically increase the price of castings in many cases, which make the path to higher prices for machine tools increasingly clear. A number of major producers have resisted strongly any temptation to boost, and indicated a definite willingness to absorb costs so long as possible, but the increase in pig iron will leave many without a choice.

Hold-ups on new tooling orders and the recent cancellation of the 1948 dies for Oldsmobile, Pontiac and Chevrolet 1948 models have combined to give the tool and die industry in Detroit, at least, a bad case of the jitters. There is plenty of evidence that big companies like GM and Ford are retrenching sharply and all signs point to the fact that the introduction of new models will be delayed for a long time.

Changes in the new models will undoubtedly be restricted to restyling that can be done quickly and economically. Inquiries for new tooling are still coming in but the number of firm orders being written seems to have dropped off sharply.

As one prominent machine tool producer in Detroit put it: "I'm looking forward to a period of perhaps two years in which retooling will be held to a bare minimum by the automobile industry."

This statement confirms the remarks of numerous machine tool distributors and sales representatives who long ago recognized that the dew was off the post-war lily. According to some builders in the New England region, November was a reasonably profitable month with shipments and orders running even or slightly better than October. Others, however, reported shipments and orders no-

ticeably down from October levels.

From the East it is reported that the end of the coal strike should do much within the next 6 months to improve the position on shipments of new tools, which is reported at this time to be very bad. However, an almost complete cut-off on orders for machinery, due to the drastic reduction of the War Assets Administration machine tool prices, has at least prevented any build-up of the backlog during the strike period. Tool builders are continuing to find great difficulty in obtaining castings and small motors. As a result of materials shortages and the present labor situation, observers consider that the present quality of machines, generally, is not up to prewar standards.

It is understood that the government has recently mailed out a letter to machine tool builders asking for their recommendations on the type and number of surplus machines to be set aside in the stockpiles for emergency use. It is too early yet to have accumulated any information on the returns from this inquiry. No other steps have yet been taken to comply with the industry's recommended stockpiling program.

The Attorney-General is reported to have resolved the disagreement between dealers and the Advisory Committee Branch of the General Disposal Agencies of WAA by agreeing to the use of "Metalworking Machinery and Equipment Industry Advisory Committee of the War Assets Administration." The committee name desired by the Advisory Committees Branch was the Metalworking Machinery and Equipment Contract Dealers Advisory Committee of WAA, which dealers pointed out would limit their sphere of activities to dealers' problems. As a group it was considered undesirable for them to make the personal expenditure of time and money necessary to carry out their activities when they

were prevented from studying all problems related to surplus machine tool disposal.

Speaking to the National Association of Manufacturers' annual convention in New York last week, Robert M. Gaylord, president, Ingersoll Milling Machine Co., Rockford, Ill., predicted a promising future for the machine tool industry. The industry's present capacity, he said, is about 40 pct greater than it was before the war, though it is now operating at somewhat less than a quarter of its peak production rate.

Manufacturing costs, he said, have increased considerably, with labor up 70 pct and materials a good 50 pct higher. Inability to secure rough materials and finished goods because of work stoppages has both increased inventories and held up shipments.

He saw in the slowdown of new inquiries and orders a danger signal for all industry, for it is in the durable goods industries that recessions start. He favored spending depreciation reserves to avoid "boom and bust" cycles.

To Build 500 Thunderjets

Washington

••• The War Dept. has announced that 500 P-84 Thunderjet fighter planes constitute the bulk of an order of new military aircraft costing approximately \$25 million which has been awarded by the Army Air Forces to the Republic Aviation Corp. The Thunderjet is the first American jet fighter to exceed 600 mph as standard performance and now holds the all-time official American speed record of 611 mph.

Assembly line production of P-84 Thunderjets is under way at the Republic Plant at Farmingdale, Long Island, with cumulative AAF orders calling for production of more than 500 of the new jet fighters.



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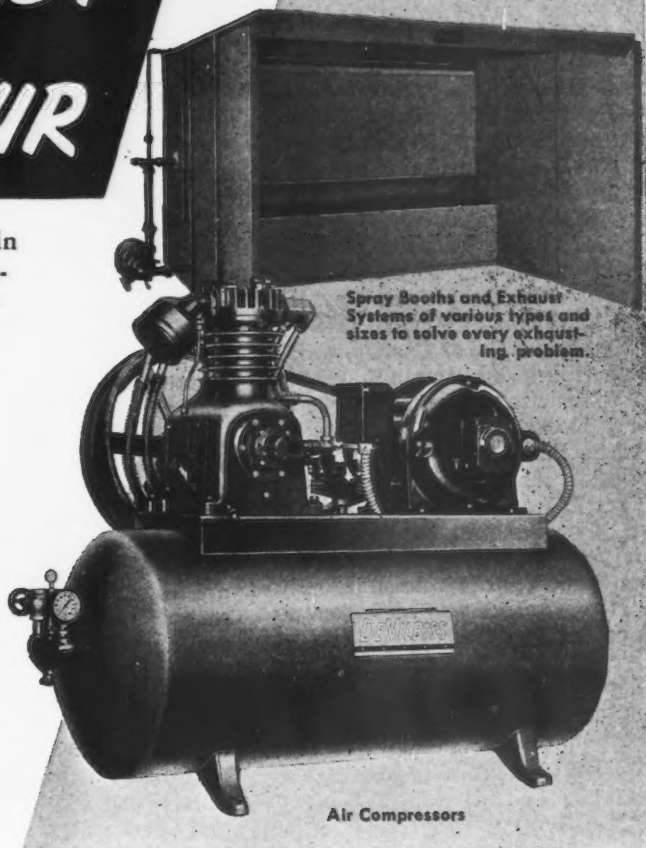
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NONFERROUS METALS

... News and Market Activities

Aluminium Ltd. to Establish 300 Million-lb Sheet Mill in Britain

Montreal

... Officials of Aluminium Ltd. announced plans for large scale expansion of fabricating facilities in the United Kingdom to provide broader markets for Canadian aluminum. Under the new program a continuous type rolling mill for aluminum sheet products, the largest of its kind outside of the United States is under construction near Newport, Monmouthshire, a site owned by the company's British subsidiary. It will be the most modern aluminum rolling mill in Great Britain, and plans call for completion in 1948. The plant will have a capacity of 150 million lb of aluminum sheet products per year and is designed for expansion to 300 million-lb capacity.

Most of the output from the British plant will be rolled from aluminum ingots provided by the Canadian plant at Arvida, Que.

Aluminium Co. of Canada, which is controlled by Aluminium Ltd., for the month of October exported bars, blocks, blooms, and ingots totaling 5,297 tons, which was 70 pct below the September figure and 90 pct under the exports for August. For the first ten months of this year exports of aluminum ingots from Canada totaled 126,000 short tons which was equivalent to 38 pct of the effective capacity of the company's Arvida plant. The following table shows the distribution of aluminum exports in net tons for the first ten months of this year:

United Kingdom	57,067
United States	25,006
Switzerland	8,008
India	7,311
Czechoslovakia	6,482
France	3,480
Miscellaneous	18,646
Total	126,000

Aluminium Co. of Canada has announced a \$500,000 expansion program for its works at Shawinigan Falls, Quebec, to increase the capacity by approximately 30 pct. The addition comprises the installation of new stranding and wire drawing machines, and alterations to existing buildings at Plant No. 1 made necessary by the present and expected increased demand for aluminum cable and other aluminum wire products.

Lend-Lease Lead Returned

Washington

... The Dept. of State has announced that RFC soon will return to the United States 450 tons of pig lead of Lend-Lease origin located at Rangoon, Burma. The State Dept. said that this lead was part of a former Lend-Lease shipment destined for China which never arrived there because of the wartime Japanese occupation of Burma.

Aluminum

New York

... Aluminum scrap prices continue to rise and with them ingot prices which are now well in excess of the prices of primary pig and ingot. Aluminum scrap is getting more and more difficult to obtain but it is the opinion in some quarters that dealers may be holding back on sales for year end inventory purposes and may release some metal after that time. Current ingot prices are quoted as follows: No. 12 aluminum (No. 2 grade) 15.75¢ to 16.50¢; piston alloys (No. 122 grade) 16.00¢ to

16.50¢; No. 108 alloy 16.00¢ to 16.75¢; No. 195 alloy 16.75¢ to 17.25¢; ASX 679 16.25¢ to 16.75¢; steel deoxidizing grades—No. 1 16.75¢, No. 2 16.25¢, No. 3 15.75¢, No. 4 15.25¢ to 15.50¢.

Silver Price Dips

New York

... Reflecting a large offering of silver from London, Handy & Harman early last week lowered the price from 90 $\frac{1}{8}$ ¢ per oz to 87 $\frac{1}{2}$ ¢. It was reported that weakness in the Bombay market, one of the world's principal silver trading centers was the cause of the British offering. However, later in the week the price rose by $\frac{1}{4}$ ¢, closing at 87 $\frac{3}{4}$ ¢ per oz. There has been little fluctuation in the silver market for the past 2 months; this is the first noticeable movement it has taken since early in October.

Copper

New York

... With the world copper supply extremely tight and foreign buyers bidding against one another for the available supply, it is possible that the price of foreign copper may rise somewhat in the near future above the current price of 18.50¢ f.a.s. New York. It is understood that the Italian purchasing commission has been attempting unsuccessfully to place an order with producers for 18,000 tons of refined copper and 4500 tons of blister copper. The Office of Metals Reserve expects to make available to domestic consumers some 60,000 tons of stockpiled copper this month.

Canadian Copper Drops

Ottawa

... Production of new copper in Canada in September amounted to 28,846,510 lb against 29,947,283 lb in August and 35,023,084 lb in September 1945, according to the Dominion Bureau of Statistics. Output for the first nine months of this year totaled 275,631,620 lb compared with 375,608,330 lb in the like period of 1945.

Nonferrous Metals Prices

Cents per pound

	Dec. 4	Dec. 5	Dec. 6	Dec. 7	Dec. 9	Dec. 10
Copper, electro, Conn.	19.50	19.50	19.50	19.50	19.50	19.50
Copper, Lake, Conn.	19.625	19.625	19.625	19.625	19.625	19.625
Tin, Straits, New York	70.00	70.00	70.00	....	70.00	70.00
Zinc, East St. Louis	10.50	10.50	10.50	10.50	10.50	10.50
Lead, St. Louis	11.65	11.65	11.65	11.65	11.65	11.65

NONFERROUS METALS PRICES

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, f.o.b. shipping point (min. 10,000 lb).....	15.00
Aluminum pig, f.o.b. shipping point.....	14.00
Antimony, American, Laredo, Tex.	23.50
Beryllium copper, 3.75-4.25% Be; dollars per lb contained Be.....	\$14.75
Beryllium aluminum, 5% Be; dollars per lb contained Be.....	\$30.00
Cadmium, dehd.....	\$1.50
Cobalt, 97-99% (per lb).....	\$1.50 to \$1.57
Copper, electro, Conn. Valley.....	19.50
Copper, lake, Conn. Valley.....	19.625
Gold, U. S. Treas., dollars per oz.....	\$35.00
Indium, 99.8%, dollars per troy oz.....	\$2.25
Iridium, dollars per troy oz.....	\$125.00
Lead, St. Louis.....	11.65
Lead, New York.....	11.80
Magnesium, 99.8 + %.....	20.50
Magnesium, sticks, carlots.....	36.00
Mercury, dollars per 76-lb flask, f.o.b. New York.....	\$89 to \$90
Nickel, electro, f.o.b. refinery.....	24.00
Palladium, dollars per troy oz.....	\$69 to \$72
Platinum, dollars per troy oz.....	\$87.75
Silver, New York, cents per oz.....	70.00
Tin, Straits, New York.....	10.50
Zinc, East St. Louis.....	10.94
Zinc, New York.....	10.94
Zirconium copper, 6 pct Zr, per lb contained Zr.....	\$ 6.00

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot	
No. 115.....	20.50
No. 120.....	20.00
No. 123.....	19.50
80-10-10 ingot	
No. 305.....	23.50
No. 315.....	22.00
85-10-2 ingot	
No. 210.....	25.75
No. 215.....	24.75
No. 245.....	21.75
Yellow ingot	
No. 405.....	16.25
Manganese Bronze	
No. 421.....	18.25

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 alum.-sil. alloys:	
0.30 copper, max.....	17.00
0.60 copper, max.....	16.75
Piston alloys (No. 122 type).....	16.00-16.50
No. 12 alum. (No. 2 grade).....	15.75-16.50
108 alloy.....	16.00-16.75
195 alloy.....	16.75-17.25
AKS-679.....	16.25-16.75
Steel deoxidizing aluminum, notch-bar, granulated or shot.....	
Grade 1-95 pct-97½ pct.....	16.75
Grade 2-92 pct-95 pct.....	16.25
Grade 3-90 pct-92 pct.....	15.75
Grade 4-85 pct-90 pct.....	15.25-15.50

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer.....	36%
Electrodeposited.....	30%
Roller, oval, straight delivered.....	31½
Curved, 18 in. or longer, delivered.....	31½
Brass, 80-20, frt allowed	
Cast oval, 15 in. or longer.....	33%
Zinc, Cast, 99.99.....	18%
Nickel, 99 pct plus, frt allowed	
Cast.....	51
Roller, depolarized.....	52
Silver, 999 fine	
Roller, 1000 oz lots, per oz.....	93%

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 1-5 bbl.....	
Copper sulphate, 99.5, crystals, bbls.....	14.50
Nickel salts, single, 425 lb bbls, frt allowed.....	0.749
Silver cyanide, 100 oz lots, per oz.....	15.00
Sodium cyanide, 96 pct, domestic, 125 lb drums.....	33.00
Zinc cyanide, 100 lb drums.....	0.635
Zinc, sulphate, 89 pct, crystals, bbls, frt allowed.....	

Mill Products

Aluminum

(Cents per lb, base, subject to extras for quantity, gage, size, temper and finish)

Drawn tubing: 2 to 3 in. OD by 0.065 in. wall: 3S, 43.5¢; 52S-O, 67¢; 24S-T, 71¢; base, 30,000 lb.

Plate: ¼ in. and heavier: 2S, 3S, 21.2¢; 52S, 24.2¢; 61S, 23.8¢; 24S, 24S-AL, 24.2¢; 75S, 75S-AL, 30.5¢; base, 30,000 lb.

Flat Sheet: 0.136-in. thickness: 2S, 3S, 23.7¢; 52S, 27.2¢; 61S, 24.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢; base, 30,000 lb.

Extruded Solid Shapes: factor determined by dividing the perimeter of the shape by its weight per foot. For factor 1 through 4, 3S, 26¢; 14S, 32.5¢; 24S, 35¢; 53S, 61S, 23¢; 63S, 27¢ 75S, 45.5¢; base, 30,000 lb.

Wire, Rod and Bar: screw machine stock, rounds, 17S-T, ¼ in., 29.5¢; ½ in., 37.5¢; 1 in., 26¢; 2 in., 24.5¢; hexagons, ¼ in., 35.5¢; ½ in., 30¢; 1 in., 2 in., 27¢; base, 5000 lb. Rod: 2S, 3S, 1¼ to 2½ in. diam, rolled, 23¢; cold-finished, 23.5¢ base, 30,000 lb. Round Wire: drawn, coiled, B & S gage 17-18: 2S, 3S, 33.5¢; 56S, 39.5¢; 10,000 lb base; B & S gage 00-1: 2S, 3S, 21¢; 56S, 30.5¢. B & S 15-16: 2S, 3S, 32.5¢; 56S, 38¢; base, 30,000 lb.

Magnesium

(Cents per lb, f.o.b. mill)

Sheet and Plate: Mx, FSA, ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 14, 69¢-74¢; 16, 79¢-81¢; 18, 87¢-89¢; 22, \$1.25-\$1.31; 24, \$1.71-\$1.75. Base quantity, 30,000 lb.

Round Rod: M, diam in. ½, 55¢; ¾, 47¢; 1, 46¢; 1½, 45¢; 2, 44¢; 2½, 43.5¢; 3, 41.5¢; 4, 42.5¢; 5, 43.5¢; 6 & 7 in., 44¢. Base price, 5000-10,000 lb.

Square and Hexagonal Bar: M, diam in. ¾, 58¢; 1, 50¢; 1½, 48¢; 2, 47.5¢; 2½, 46.5¢; 3, 45.5¢; 4, 45¢; 5, 44.5¢; 6 & 7 in., 45¢. Base quantity, 5000-10,000 lb.

Tubing: Varies with wall thickness and outside diameter.

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled.....	54	43
No. 35 sheets.....	41	
Strip, cold-rolled.....	60	44
Rod		
Hot-rolled.....	50	39
Cold-drawn.....	55	44
Angles, hot-rolled.....	50	39
Plates.....	52	41
Seamless tubes.....	83	71
Shot and blocks.....		31

Zinc

(Cents per lb, f.o.b. mill)

Sheet, l.c.l.....	15.40
Ribbon, ton lots.....	14.50
Plates	
Small.....	13.25
Large, over 12 in.....	14.25
Lithographic, ungrained.....	17.25

Copper, Brass, Bronze

(Cents per lb)

	Extruded Shapes	Rods	Sheets
Copper.....	30.78		30.93
Copper, hot-rolled.....	27.28		
Copper, drawn.....	28.28		
Low brass, 80 pct.....	27.52	28.71	29.02
High brass.....	36.03	27.22	27.53
Red brass, 85 pct.....	38.03	29.22	29.53
Naval brass.....	27.50	26.25	32.19
Brass, free cutting.....	39.06	30.25	30.56
Commercial bronze.....	31.07	29.57	35.69
Manganese bronze.....		49.07	48.82
Phosphor bronze, 5 pct.....	27.19	25.94	30.38
Muntz metal.....			
Everdur, Herculey.....	34.45	34.73	35.79
Olympic, etc.....		38.11	36.34
Nickel silver, 5 pct.....	26.01		
Architectural bronze.....			

Scrap Metals

(Dealers' buying prices, f.o.b. New York)

Copper and Brass

(Cents per lb)

No. 1 heavy copper and wire.....	14½-15¼
No. 2 heavy copper and wire.....	13¾-14¼
Light copper.....	12¼-12¾
Auto radiators (unsweated).....	12-12¼
No. 1 composition.....	14¼-14¾
No. 1 composition turnings.....	13¼-13¾
Clean red car boxes.....	11-11½
Clocks and faucets.....	11½-12
Mixed heavy yellow brass.....	9½-10
Old rolled brass.....	8¾-9¼
Brass pipe.....	10¼-10¾
New soft brass clippings.....	11-11½
Brass rod ends.....	9¾-10¼
No. 1 brass rod turnings.....	10-10½

Aluminum

(Cents per lb)

Alum. pistons with struts.....	4½-5
Aluminum crankcases.....	7¼-7½
2S aluminum clippings.....	8-8¼
Old alum. Sheet & utensils.....	7½-8
Mixed alum. borings and turnings.....	2-2¼
Misc. cast aluminum.....	7-7½
Dural clips (24S).....	6-6½

Zinc

(Cents per lb)

New zinc clippings.....	7-7½
Old zinc.....	5¼-5¾
Zinc routings.....	3-3½
Old die cast scrap.....	3-3½

Nickel and Monel

(Cents per lb)

Pure nickel clippings.....	18-19
Clean nickel turnings.....	14-15
Nickel anodes.....	16½-17½
Nickel rod ends.....	17-18
New Monel clippings.....	15-16
Clean Monel turnings.....	10-10½
Old sheet Monel.....	12-12½
Old Monel castings.....	10-11
German silver clippings, mixed.....	10½-11
German silver turnings, mixed.....	7-7½

Lead

(Cents per lb)

Soft scrap lead.....	9½-10
Battery plates (dry).....	5¼-5½

Miscellaneous

(Cents per lb)

Block tin.....	60-
No. 1 pewter.....	46-48
No. 1 auto babbitt.....	36-37
Mixed common babbitt.....	12-12½
Solder joints.....	13
Siphon tops.....	30-32
Small foundry type.....	15-15½
Monotype.....	12½-13
Lino and stereotype.....	12-12½
Electrotype.....	10-10½
New type shell cuttings (nom.).....	11-11½
Clean hand picked type shells.....	5-5½
Lino and stereo dross.....	5½-6
Electro dross.....	3½-4

Lead Products

(Cents per lb)

F.o.b. shipping point freight collect. Freight equalized with nearest free delivery point.....	
Full lead sheets.....	14.90
Cut lead sheets.....	15.40
Lead pipe, manufacturing point.....	14.15
Lead traps and bends.....	List +33 1/3%
Combination lead and iron bends and ferrules, also combination lead and iron ferrules.....	List +33 1/3%
Drum traps, U.S. list.....	List +33 1/3%
Montclair traps.....	List +33 1/3%
Lead burned bath traps.....	List +60%
Lead wool.....	16.30
Calking lead.....	13.30

SCRAP

... News and Market Activities

Market Unaffected by End of Coal Strike

New York

... Early this week the settlement of the coal strike had no marked effect on the scrap market. True, many cars were loaded by strenuous overtime before Thursday of last week and many dealers found themselves short of cars early this week. Shipments were therefore below those at the same time last week though a return to the normal rate of the past few months is expected before the week is out.

Underneath the current market prices there is an undercurrent of pressure to push up heavy melting steel prices. However the forces tending to counteract higher prices—some railroads, steel mills and brokers—have so far succeeded in holding the price line at last week's level.

But the forces tending to push prices through their present levels are not inconsiderable either. Reports from Pittsburgh, Chicago, New York and Cleveland indicate that the market is feeling the pressure although it hasn't yet been strong enough to affect going prices in those centers. Relatively small inventories in the hands of producers is another factor on the bullish side. Most observers feel that within the next few weeks this situation will resolve itself one way or the other.

According to a War Dept. announcement, wrecked vehicles and other battlefield scrap in Europe henceforth will be offered for sale on the spot to American buyers for return to the United States. Thus the Government will no longer bear the cost of returning this material, which at best has been a very small factor in the American market. Whether scrap firms in this country will find it economically feasible to return the 100,000 to 300,000 tons reportedly in Europe is another question.

PITTSBURGH—The unexpected end of the coal strike left steel mills with the job of undoing all the plans made during last weekend, and left the scrap market active but stable. Observers here feel that scrap prices may begin a new advance, but actually no sales are reported at over the prices quoted for the past couple of weeks. A move upward in

prices of low phos scrap will likely mark the beginning of the upward trend in prices if it should come. The market has a strong undertone, but no actual offers at advanced prices have been made. When the market does break, it is expected that small mill consumers will lead the way because the larger mills are trying hard to hold present prices. Some consumers have been able to lay down some scrap during the recent coal layoff.

CHICAGO—The arbitrary tradition of Chicago scrap prices being lower than Pittsburgh seems to have vanished, and may well reverse itself soon. Efforts by the mills to revert to 23.75 for heavy melting are not meeting with success. The last railroad list went at top prices and cast is still in very high demand. With operations back up the scramble for scrap is intensified as iron will not be plentiful for months to come. Although the extension of the shipping date from Dec. 5, on the large contracts closed at \$25 is supposed to be a secret, at least two brokers and one mill consider it effective until the end of the month.

PHILADELPHIA — There were no changes in the prices of scrap here this week. Mills report that scrap shipments last week were less than the recent weeks' shipments and scrap dealers report that this was due to a freight car shortage. The short-lived freight embargo would not have affected scrap shipments to most mills here as the Pennsylvania, Reading and B & O would take shipments for delivery along their own lines despite the embargo.

NEW YORK—Shipments this week are off in this area, suffering after effects of the rail embargo. Last week dealers worked overtime to get material into cars before the Thursday midnight deadline with the result that loading operations on Friday, Saturday and early this week were off sharply. Even though cars are now available for spotting and some stocks have accumulated it is not expected that total shipments will be back to normal for this week.

DETROIT—With the coal strike hanging over the market last week very little scrap moved in this area. Steel scrap is generally going according to the formula of \$5 over previous ceilings. Since most scrap continues to be allocated to mills there are only minor departures from these prices and there is almost no short selling on the part of brokers. The market for cast foundry grades is still unsettled but buying resistance to present prices is evident.

CLEVELAND—To all appearances the scrap price formula still prevails, but shipments are about half of what buyers would like to have coming in and the undercurrents are in the direction of

further increases. Much trading is going on, particularly in some of the down-state areas, and some smaller consumers have broken through the formula. Continuation of this will mean, of course, that mills will have to meet the higher prices, but this move will probably not be made right away.

BOSTON—The sudden collapse of the coal strike has improved trade sentiment but not the movement of scrap to any appreciable extent. Sales the past week include scattered carlots of No. 1 busheling to Worcester and Pennsylvania points, but almost no heavy melting steel moved. Foundries are not only plagued with a lack of pig iron but a real scarcity of cast. They are, however, getting some low phos.

BUFFALO—Movement and prices have levelled off here, with shipments to mills providing little margin for stockpiling. While the general undertone of the market is healthy, some dealers report occasional consumer resistance to the full advance on lighter grades. A 5,000-ton shipload of heavy melting steel and a like cargo of rail scrap arrived over the weekend, and the last Lake scrap cargo of the 1946 navigation season is due late this week.

ST. LOUIS—The market rose sharply during the week as some mills were willing to pay higher prices because of the scarcity of some items. Dealers express the opinion that the supply is not as large as had been expected. Railroads are selling their lists to the highest bidder regardless of whether such bids are above the \$5 increase first set after decontrol. New lists are Louisville & Nashville, 4500 tons; and Southwestern, 1500 tons.

CINCINNATI—Demand for scrap is still heavy in this area, but with many interests curtailing production last week because of the coal shortage the acts to conserve coke may mean supplies of blast furnace scrap will be adequate. Prices seem to be finding their level. However, railroad list bids when announced will possibly show scrap steel pointing upward.

BIRMINGHAM—Mills in this district are adhering to the general \$5 a ton increase for all steel grades but prices on cast grades are fluctuating according to the urgency of consumer needs. Major railroads here are offering tonnages of steel grades at the \$5 a ton increase.

TORONTO — Canada's scrap supply situation has failed to show direct improvement despite larger offerings from industrial plants. Demand for both iron and steel scrap is well ahead of supply and steel mills have been drawing heavily on stock piles for current requirements with the result that inventories have been sharply reduced with no indications of replenishing. Iron scrap is scarce with only small lots appearing on the market.

Per
No. 1 hv
RR. hv
No. 2 hv
RR. scr
Rais 3 f
No. 1 co
Hand be
Hvy. ax
Hvy. ste
Mach. s
Short sh
Mixed b
Cast iron
No. 1 c
Heavy h
Malleab
RR. Kn
RR. col
Rail les
Rolled
Low p

Per
No. 1 hv
No. 2 hv
No. 1
No. 2
Bundled
Galv. l
Mach. l
Short
Cast iron
Mix. b
Low p
Low p
No. 1
Reroll
Miscel
Angles
Locom
Cut b
Stand
No. 3
Couple
Malle
No. 1
Rais
No. 1
Hvy.
RR. f
Cast
Stove
Clean
Cast

No.
No.
No.
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Mach
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IRON AND STEEL SCRAP PRICES

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$25.00 to \$25.50
RR. hvy. melting	26.00 to 26.50
No. 2 hvy. melting	25.00 to 25.50
RR. scrap rails	26.50 to 27.00
Rails 3 ft. and under	28.50 to 29.00
No. 1 comp'd bundles	25.00 to 25.50
Hand bldd. new shts.	25.00 to 25.50
Hvy. axle turn.	24.50 to 25.00
Hvy. steel forge turn.	24.50 to 25.00
Mach. shop turn.	20.00 to 20.50
Short shov. turn.	22.00 to 22.50
Mixed bor. and turn.	20.00 to 20.50
Cast iron borings	20.00 to 20.50
No. 1 cupola cast	34.00 to 35.00
Heavy breakable cast	25.00 to 25.50
Malleable	29.00 to 29.50
RR. Knuck. and coup.	30.00 to 30.50
RR. coil springs	30.00 to 30.50
Rail leaf springs	30.00 to 30.50
Roller steel wheels	30.00 to 30.50
Low phos.	27.50 to 28.00

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$25.00 to \$25.50
No. 2 hvy. melting	25.00 to 25.50
No. 1 bundles	25.00 to 25.50
No. 2 dealers' bndls.	25.00 to 25.50
Bundled mach. shop turn.	25.00 to 25.50
Galv. bundles	21.50 to 22.00
Mach. shop turn.	18.75 to 19.25
Short shovels, turn.	20.75 to 21.25
Cast iron borings	19.75 to 20.25
Mix. borings & turn.	18.50 to 19.00
Low phos. hvy. forge	28.00 to 30.00
Low phos. plates	26.50 to 27.50
No. 1 RR. hvy. melt.	24.75 to 26.50
Reroil rails	34.50 to 35.00
Miscellaneous rails	33.00 to 33.50
Angles & splice bars	30.00 to 33.25
Locomotive tires, cut	24.25*
Cut bolsters & side frames	28.50 to 29.00
Standard stl. car axles	29.50 to 31.00
No. 3 steel wheels	28.50 to 29.00
Couplers & knuckles	28.50 to 29.00
Malleable	35.00 to 40.00
No. 1 mach. cast	37.50 to 42.00
Rails 3 ft. and under	32.00 to 32.50
No. 1 agricul. cast	30.00 to 35.00
Hvy. breakable cast	30.00 to 35.00
RR. grate bars	31.50 to 32.00
Cast iron brake shoes	30.25 to 30.50
Stove plate	33.50 to 34.00
Clean auto cast	27.00*
Cast iron carwheels	30.50 to 31.00

CINCINNATI

Per gross ton delivered to consumer:

Cast grades f.o.b. shipping point

No. 1 hvy. melting	\$23.70
No. 2 hvy. melting	23.70
No. 1 bundles	23.70
No. 2 bundles	23.70
Mach. shop turn.	\$15.50 to 16.00
Shoveling turn.	17.50 to 18.00
Cast iron borings	16.50 to 17.00
Mixed bor. & turn.	16.50 to 17.00
Low phos. plate	27.00
No. 1 cupola cast	30.00
Hvy. breakable cast	25.00
Stove plate	23.00
Scrap rails	26.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	\$20.35
No. 2 hvy. melting	20.35
Nos. 1 and 2 bundles	20.35
Busheling	20.35
Turnings, shovellings	\$17.00 to 17.35
Machine shop turn.	15.00 to 15.35
Mixed bor. & turn.	15.00 to 15.35
Cl'n cast, chem. bor.	16.50 to 17.00
No. 1 machinery cast	40.00
Heavy breakable cast	35.00
Stove plate	40.00

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	\$22.32
No. 2 hvy. melting	22.32
No. 1 bundles	22.32
New busheling	22.32
Flashings	22.32
Mach. shop turn	17.32
Short shov. turn	19.32

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages. Pending establishment of a market in some districts and in certain grades, the former OPA ceiling price is inserted for reference, followed by an asterisk.

Cast iron borings	18.32
Mixed bor. & turn.	17.32
Low phos. plate	24.8*
No. 1 cupola cast	\$39.00 to 41.00
Charging box cast	38.00 to 40.00
Hvy. breakable cast	35.00 to 37.00
Stove plate	38.00 to 40.00
Automotive cast	35.00 to 40.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$24.00 to \$25.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 bundles	24.00 to 25.00
No. 2 bundles	24.00 to 25.00
Mach. shop turn.	18.75 to 19.25
Shoveling turn.	21.25 to 21.75
Cast iron borings	18.75 to 19.25
Mixed bor. & turn.	18.75 to 19.25
No. 1 cupola cast	40.00 to 41.00
Hvy. breakable cast	35.00 to 36.00
Cast. charging box	36.00 to 37.00
Clean auto cast	40.00 to 41.00
Hvy. axle forge turn.	23.25 to 23.75
Low. phos. plate	26.50 to 27.50
Low phos. punchings	26.50 to 27.50
RR. steel wheels	26.50 to 27.50
RR. coil springs	26.50 to 27.50
RR. malleable	34.00 to 35.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$22.50
Bundled sheets	22.50
Mach. shop turn.	16.50
Locomotive tires, uncut.	23.5*
Misc. std. sec. rails	30.00 to 32.00
Rerolling rails	33.00 to 35.00
Steel angle bars	27.00 to 28.00
Rails 3 ft. and under	35.00 to 36.00
RR. springs	27.00 to 28.00
Steel car axles	29.50 to 30.00
Stove plate	30.00 to 35.00
Grate bars	30.00 to 32.50
Brake shoes	25.00 to 26.00
Malleable	35.00 to 40.00
Cast iron carwheels	29.00 to 30.00
No. 1 mach'ery cast	35.00 to 40.00
Breakable cast	27.50 to 30.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$22.00 to \$22.50
No. 2 hvy. melting	22.00 to 22.50
No. 2 bundles	22.00 to 22.50
No. 1 busheling	22.00 to 22.50
Long turnings	15.00 to 16.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	16.00 to 17.00
Bar crops and plate	24.18 to 25.18
Structural and plate	24.18 to 25.18
No. 1 cast	34.00 to 38.00
Stove plate	30.00 to 35.00
Steel axles	23.00 to 23.50
Scrap rails	24.50 to 25.00
Rerolling rails	26.50 to 27.00
Angles & splice bars	25.50 to 26.50
Rails 3 ft & under	26.50 to 27.00
Cast iron carwheels	22.00*

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$25.00 to \$25.50
No. 2 hvy. melting	25.00 to 25.50
Low phos. plate	27.50 to 28.00
No. 1 busheling	23.00 to 23.50
Hydraulic bundles	25.00 to 25.50
Mach. shop turn.	20.00 to 20.50
Short shov. turn.	22.00 to 22.50
Cast iron borings	21.00 to 21.50

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	\$20.33
No. 2 hvy. melting	20.33
Comp. black bundles	20.33
Comp. galv. bundles	18.33
Mach. shop turn.	15.33
Mixed bor. & turn.	15.33
Shoveling turn.	17.33
No. 1 cupola cast	\$35.00 to 37.00
Hvy. breakable cast	25.00 to 27.00

Charging box cast	35.00 to 37.00
Stove plate	35.00 to 37.00
Clean auto cast	35.00 to 37.00
Unstrip. motor blks.	25.00 to 27.00
Cl'n chem. cast bor.	19.33

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$24.25 to \$24.75
No. 1 bundles	24.25 to 24.75
No. 2 bundles	24.25 to 24.75
No. 2 hvy. melting	24.25 to 24.75
Mach. shop turn.	18.75 to 19.25
Shoveling turn.	20.75 to 21.25
Cast iron borings	19.75 to 20.25
Mixed bor. & turn.	18.75 to 19.25
No. 1 cupola cast	28.00 to 30.00
Charging box cast	24.00 to 26.00
Stove plate	26.00 to 28.00
Clean auto cast	28.00 to 30.00
Malleable	29.00 to 29.50
Low phos. plate	27.00 to 29.00
Scrap rails	25.75 to 26.25
Rails 3 ft. & under	27.75 to 28.25
RR. steel wheels	28.75 to 29.25
Cast iron carwheels	27.00 to 27.50
RR. coil & leaf spgs.	28.75 to 29.25
RR. knuckles & coup.	28.75 to 29.25
No. 1 busheling	24.25 to 24.75

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	\$24.50 to \$25.00
No. 2 hvy. melting	24.50 to 25.00
Compressed sheet stl.	24.50 to 25.00
Drop forge flashings	24.00 to 24.50
No. 2 bundles	24.50 to 25.00
Mach. shop turn.	19.50 to 20.00
Short shovel	21.50 to 22.00
No. 1 busheling	24.50 to 25.00
Steel axle turn.	24.00 to 24.50
Cast iron borings	20.50 to 21.00
Mixed bor. & turn.	19.50 to 20.00
No. 2 busheling	22.00 to 22.50
No. 1 machinery cast	34.50 to 35.00
Malleable	32.50 to 33.00
Railroad cast	34.50 to 35.00
Railroad grate bars	29.50 to 30.00
Stove plate	32.00 to 32.50
RR. hvy. melting	25.50 to 26.00
Rails 3 ft. & under	31.50 to 32.00
Rails 18 in. & under	33.50 to 34.00
Rails for rerolling	30.50 to 31.00
Elec. furnace punch	27.00 to 27.50

SAN FRANCISCO

Per gross ton delivered to consumer:

Cast grade f.o.b. shipping point

No. 1 hvy. melting	\$19.50
No. 2 hvy. melting	19.50
No. 2 bales	19.50
No. 3 bales	16.00
Mach. shop turn.	13.00
Elec. furn. 1 ft. und.	19.50*
No. 1 cupola cast	25.00*
RR. hvy. melting	20.50

LOS ANGELES

Per gross ton delivered to consumer:

Cast grade f.o.b. shipping point

No. 1 hvy. melting	\$19.50
No. 2 hvy. melting	19.50
No. 1 bales	19.50
No. 2 bales	19.50
No. 3 bales	16.00
Mach. shop turn.	13.00
No. 1 cupola cast	25.00
RR. hvy. melting	20.50

SEATTLE

Per gross ton delivered to consumer:

Cast grade f.o.b. shipping point

No. 1 & No. 2 hvy. melting	\$17.00
Elec. furn. 1 ft. und.	17.00
No. 1 cupola cast	25.00*
RR. hvy. melting	16.00

HAMILTON, ONT.

Per gross ton delivered to consumer:

Cast grades f.o.b. shipping point

Heavy melting	\$17.50*
No. 1 bundles	17.50*
No. 2 bundles	17.00*
Mixed steel scrap	15.50*
Rails, remelting	18.50*
Rails, rerolling	21.50*
Bushellings	13.00*
Mixed borings & turnings	12.50*
Electric furnace bundles	20.50*
Manganese steel scrap	20.00*
No. 1 cast	19.00*
Stove plate	17.50*
Car wheels, cast	19.50*
Malleable iron	16.00*

Comparison of Prices . .

Advances over past week in Heavy Type, declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel:	Dec. 10, 1946	Dec. 3, 1946	Nov. 5, 1946	Dec. 11, 1945
(cents per pound)				
Hot-rolled sheets	2.50	2.425	2.425	2.20
Cold-rolled sheets	3.20	3.275	3.275	3.05
Galvanized sheets (10 ga.)	3.55	4.05	4.05	3.70
Hot-rolled strip	2.50	2.35	2.35	2.10
Cold-rolled strip	3.20	3.05	3.05	2.80
Plates	2.50	2.50	2.50	2.25
Plates, wrought iron	4.112	4.112	4.112	3.80
Stain's c-r strip (No. 302)	30.30	30.30	30.30	28.00

Tin and Ternplate:	Dec. 10, 1946	Dec. 3, 1946	Nov. 5, 1946	Dec. 11, 1945
(dollars per base box)				
Tinplate, standard cokes..	\$5.00	\$5.00	\$5.00	\$5.00
Tinplate, electro (0.50 lb)	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30

Bars and Shapes:	Dec. 10, 1946	Dec. 3, 1946	Nov. 5, 1946	Dec. 11, 1945
(cents per pound)				
Merchant bars	2.50	2.50	2.50	2.25
Cold-finished bars	3.10	3.10	3.10	2.75
Alloy bars	2.92	2.92	2.92	2.70
Structural shapes	2.85	2.85	2.85	2.10
Stainless bars (No. 302)..	25.97	25.97	25.97	24.00
Wrought iron bars	4.76	4.76	4.76	4.40

Wire and Wire Products:	Dec. 10, 1946	Dec. 3, 1946	Nov. 5, 1946	Dec. 11, 1945
(cents per pound)				
Bright wire	3.05	3.05	3.05	2.75
Wire nails	3.75	3.75	3.75	2.90

Rails:	Dec. 10, 1946	Dec. 3, 1946	Nov. 5, 1946	Dec. 11, 1945
(dollars per net ton)				
Heavy rails	\$43.39	\$43.39	\$43.39	\$43.00*
Light rails	49.18	49.18	49.18	45.00*
*per gross ton				

Semifinished Steel:	Dec. 10, 1946	Dec. 3, 1946	Nov. 5, 1946	Dec. 11, 1945
(dollars per gross ton)				
Rerolling billets	\$39.00	\$39.00	\$39.00	\$36.00
Sheet bars	38.00	38.00	38.00	36.00
Slabs, rerolling	39.00	39.00	39.00	36.00
Forging billets	47.00	47.00	47.00	42.00
Alloy blooms, billets, slabs	58.43	58.43	58.43	54.00

Wire Rods and Skelp:	Dec. 10, 1946	Dec. 3, 1946	Nov. 5, 1946	Dec. 11, 1945
(cents per pound)				
Wire rods	2.30	2.30	2.30	2.15
Skelp	2.05	2.05	2.05	1.90

Pig Iron:	Dec. 10, 1946	Dec. 3, 1946	Nov. 5, 1946	Dec. 11, 1945
(per gross ton)				
No. 2, foundry, Phila....	\$32.43	\$30.43	\$30.43	\$27.59
No. 2, Valley furnace....	30.50	28.50	28.50	25.75
No. 2, Southern, Cin'ti...	29.80	27.80	27.80	26.19
No. 2, Birmingham.....	26.88	24.88	24.88	22.13
No. 2 foundry, Chicago†.	30.50	28.50	28.50	25.75
Basic, del'd eastern Pa...	31.93	29.93	29.93	27.09
Basic, Valley furnace....	30.00	28.00	28.00	25.25
Malleable, Chicago†....	30.50	28.50	28.50	25.75
Malleable, Valley.....	30.50	28.50	28.50	25.75
L. S. charcoal, Chicago..	42.34	42.34	42.34	42.34
Ferromanganese†	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is 40¢ per ton.
‡ For carlots at seaboard.

Scrap:	Dec. 10, 1946	Dec. 3, 1946	Nov. 5, 1946	Dec. 11, 1945
(per gross ton)				
Heavy melt'g steel, P'gh.	\$25.25	\$25.25	\$20.00	\$20.00
Heavy melt'g steel, Phila.	24.50	24.50	18.75	18.75
Heavy melt'g steel, Ch'go	25.25	25.25	18.75	18.75
No. 1 hy. comp. sheet, Det.	22.32	22.32	17.32	17.32
Low phos. plate, Youngs'n	27.75	27.75	22.50	22.50
No. 1, cast, Pittsburgh...	34.50	34.50	25.00	20.00
No. 1 cast, Philadelphia..	40.50	40.50	25.00	20.00
No. 1 cast, Chicago.....	39.75	39.75	25.00	20.00

Coke, Connellsville:	Dec. 10, 1946	Dec. 3, 1946	Nov. 5, 1946	Dec. 11, 1945
(per net ton at oven)				
Furnace coke, prompt....	\$8.75	\$8.75	\$8.75	\$7.50
Foundry coke, prompt...	8.50	8.50	8.50	9.00

Nonferrous Metals:	Dec. 10, 1946	Dec. 3, 1946	Nov. 5, 1946	Dec. 11, 1945
(cents per pound to large buyers)				
Copper, electro., Conn....	19.50	19.50	14.375	12.00
Copper, Lake, Conn.....	19.625	19.625	14.375	12.00
Tin, Straits, New York...	70.00	70.00	52.00	52.00
Zinc, East St. Louis....	10.50	10.50	9.25	8.25
Lead, St. Louis.....	11.65	11.65	8.10	6.35
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic			35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex...	23.50	23.50	14.50	14.50

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942 and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite prices for the current quarter are an estimate based on finished steel shipments for the previous quarter. These figures will be revised when the actual data of shipments for this quarter are compiled.

Composite Prices . .

FINISHED STEEL

Dec. 10, 1946.....	2.72122¢ per lb.....
One week ago.....	2.70711¢ per lb.....
One month ago.....	2.70711¢ per lb.....
One year ago.....	2.44104¢ per lb.....

HIGH	LOW
1946.... 2.73011¢ July 4	2.54490¢ Jan. 1
1945.... 2.44104¢ Oct. 2	2.38444¢ Jan. 2
1944.... 2.30837¢ Sept. 5	2.21189¢ Oct. 5
1943.... 2.29176¢	2.29176¢
1942.... 2.28249¢	2.28249¢
1941.... 2.43078¢	2.43078¢
1940.... 2.30467¢ Jan. 2	2.24107¢ Apr. 16
1939.... 2.35367¢ Jan. 3	2.26689¢ May 16
1938.... 2.58414¢ Jan. 4	2.27207¢ Oct. 18
1937.... 2.58414¢ Mar. 9	2.32263¢ Jan. 4
1936.... 2.32263¢ Dec. 28	2.05200¢ Mar. 10
1935.... 2.07642¢ Oct. 1	2.06492¢ Jan. 8
1934.... 2.15367¢ Apr. 24	1.95757¢ Jan. 2
1933.... 1.95578¢ Oct. 3	1.75836¢ May 2
1932.... 1.89196¢ July 5	1.83901¢ Mar. 1
1931.... 1.99626¢ Jan. 13	1.86586¢ Dec. 29
1930.... 2.25488¢ Jan. 7	1.97319¢ Dec. 9
1929.... 2.31773¢ May 28	2.26498¢ Oct. 29

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 pct of the United States output. Index recapitulated in Aug. 28, 1941, issue.

PIG IRON

.....\$30.14 per gross ton.....
.....\$28.13 per gross ton.....
.....\$28.13 per gross ton.....
.....\$25.37 per gross ton.....

HIGH	LOW
\$28.13 May 29	\$25.37 Jan. 1
25.37 Oct. 23	23.61 Jan. 2
\$23.61	\$23.61
23.61	23.61
23.61	23.61
\$23.61 Mar. 20	\$23.45 Jan. 2
23.45 Dec. 23	22.61 Jan. 2
22.61 Sept. 19	20.61 Sept. 12
23.25 June 21	19.61 July 6
23.25 Mar. 9	20.25 Feb. 16
19.74 Nov. 24	18.73 Aug. 11
18.84 Nov. 5	17.83 May 14
17.90 May 1	16.90 Jan. 27
16.90 Dec. 5	13.56 Jan. 3
14.81 Jan. 5	13.56 Dec. 6
15.90 Jan. 6	14.79 Dec. 15
18.21 Jan. 7	15.90 Dec. 16
18.71 May 14	18.21 Dec. 17

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

SCRAP STEEL

.....\$25.00 per gross ton.....
.....\$25.00 per gross ton.....
.....\$19.17 per gross ton.....
.....\$19.17 per gross ton.....

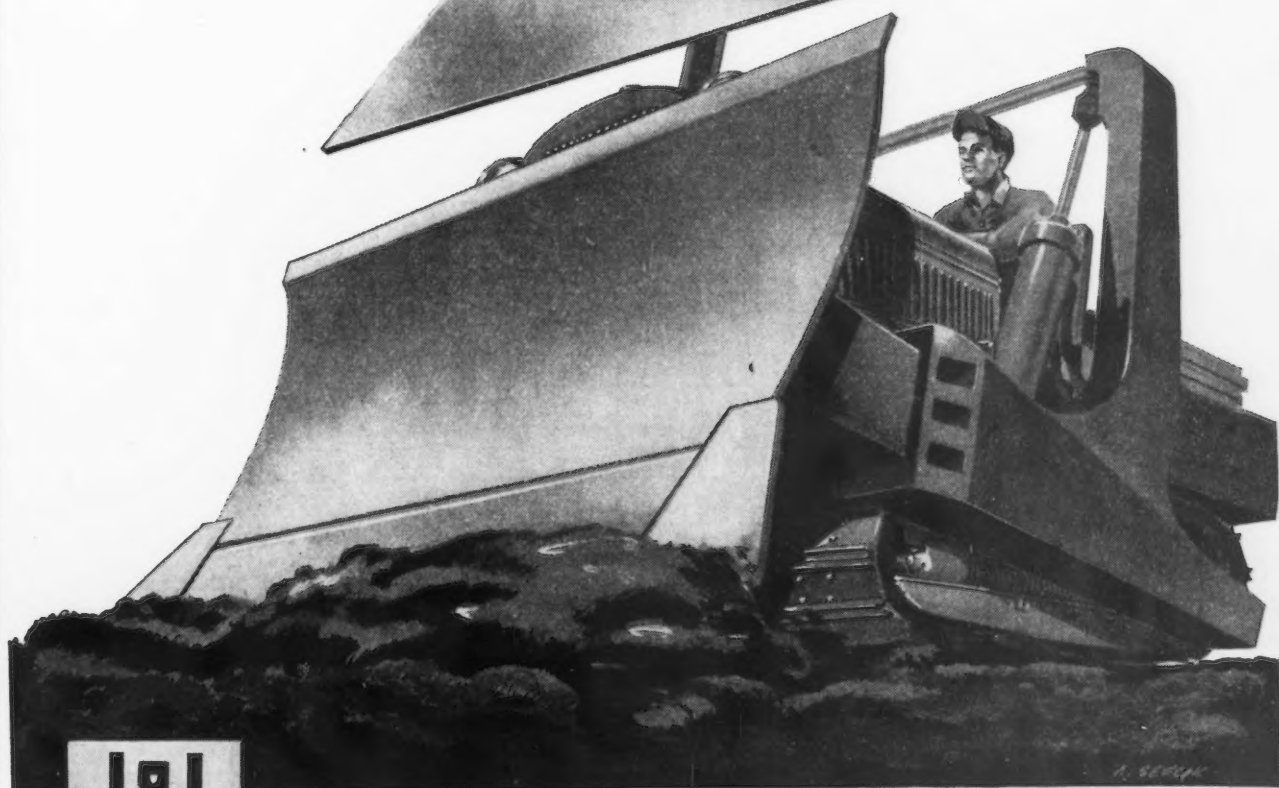
HIGH	LOW
\$25.00 Nov. 26	\$19.17
19.17 Jan. 2	\$18.92 May 22
19.17 Jan. 11	15.76 Oct. 24
\$19.17	\$19.17
19.17	19.17
\$22.00 Jan. 7	\$19.17 Apr. 10
21.83 Dec. 30	16.04 Apr. 9
22.50 Oct. 3	14.08 May 16
15.00 Nov. 22	11.00 June 7
21.92 Mar. 30	12.67 June 9
17.75 Dec. 21	12.67 June 8
13.42 Dec. 10	10.33 Apr. 29
13.00 Mar. 13	9.50 Sept. 25
12.25 Aug. 8	6.75 Jan. 3
8.50 Jan. 12	6.43 July 5
11.33 Jan. 6	8.50 Dec. 29
15.00 Feb. 18	11.25 Dec. 9
17.58 Jan. 29	14.08 Dec. 3

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia, and Chicago.

JALLOY

THE J&L TANK ARMOR VETERAN—RESISTS HEAVY IMPACTS
AND ABRASION—HAS HIGH TENSILE STRENGTH

Reduce maintenance costs and
down-time of your equipment
by specifying Jalloy for those
parts that must stand heavy
wear or are subjected to dy-
namic forces. Our metallurgical
engineers will be glad to dis-
cuss your problems. Write for
more information.



JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH 30, PA.

THE IRON AGE, December 12, 1946—131

Steel prices shown here are f.o.b. basing points, in cents per pound or dollars per gross ton. Extras apply. Delivered prices do not reflect 3 pct tax on freight. (1) Commercial quality sheet grade; primes, 25¢ above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25¢ per 100 lb to fabricators. (8) Also shafting. For quantities of 20,000 lb to 39,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (11) Boxed. (12) This base price for annealed, bright finish wires, commercial spring wire. (13) Produced to dimensional tolerances in AISI Manual Sect. 6 (14) Billets only. (15) 9/32 in. to 47/64 in., 0.15¢ per lb higher.

Ingot.	
Blooms.	
Slabs.	
Billets	
Billets.	
	Ft. V.
Bars.	Ft. V.
	Ft. V.
	Ft. V.
Plates	
Shapes	
Sheets	
Strip.	
Strip.	
Wire.	
Wire.	
Rod.	
Tubing	

(F.o.b.)

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PRICES

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

BASING POINT	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 448
Ingot, Pgh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.	Subject to negotiation		Subject to negotiation			
Blooms, Pgh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt.	22.99	24.67	17.01	17.47	20.69	25.29
Slabs, Pgh, Chi, Canton, Balt, Phila, Reading	22.99	24.67	17.01	17.47	20.69	25.29
Billets, Pgh, Chi, Canton, Watervliet, Syracuse, Balt.	Subject to negotiation		Subject to negotiation			
Billets, forging, Pgh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Watervliet, Syracuse, Ft. Wayne, Titusville	22.99	24.67	17.01	17.47	20.69	25.29
Bars, h-r, Pgh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville	27.05	25.97	20.02	20.56	24.34	29.75
Bars, c-r, Pgh, Chi, Clevel, Canton, Dunkirk, Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet	27.05	25.97	20.02	20.56	24.34	29.75
Plates, Pgh, Middletown, Canton	31.38	29.21	23.28	23.80	28.67	33.00
Shapes, structural, Pgh, Chi	27.05	25.97	20.02	20.56	24.34	29.75
Sheets, Pgh, Chi, Middletown, Canton	38.95	36.79	28.67	31.38	35.16	38.49
Strip, h-r, Pgh, Chi, Reading, Canton, Youngstown	25.43	23.28	18.39	18.93	25.97	37.87
Strip, c-r, Pgh, Clevel, Newark, N. J., Reading, Canton, Youngstown	32.46	30.30	23.80	24.34	34.62	38.28
Wire, c-d, Clevel, Dunkirk, Syracuse, Balt, Reading, Canton, Pgh, Newark, N. J., Phila.	27.05	25.97	20.02	20.56	24.34	29.75
Wire, flat, c-r, Clevel, Balt, Reading, Dunkirk, Canton	32.46	30.30	23.80	24.34	34.62	38.28
Rod, h-r, Syracuse	27.05	25.97	20.02	20.56	24.34	29.75
Tubing, seamless, Pgh, Chi, Canton, (4 in. to 8 in.)	72.09	72.09	.....	68.49	.....	.....

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, O.)

An increase of 8.2 pct applies to base price and extras

	Base per lb
High speed	67¢
Straight molybdenum	54¢
Tungsten-molybdenum	57 1/2¢
High-carbon-chromium*	43¢
Oil hardening*	24¢
Special carbon*	22¢
Extra carbon*	18¢
Regular carbon*	14¢

Warehouse prices on and east of Mississippi are 2¢ per lb higher; west of Mississippi 3¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	per lb
Field grade	3.90¢
Armature	4.25¢
Electrical	4.75¢
Motor	5.425¢
Dynamo	6.125¢
Transformer 72	6.625¢
Transformer 65	7.625¢
Transformer 58	8.125¢
Transformer 52	8.925¢

F.o.b. Chicago and Gary, field grade through motor; f.o.b. Granite City, add 10¢ per 100 lb on field grade to and including dynamo. Pacific ports add 75¢ per 100 lb on all grades.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb	
No. 1 O.H., net ton	\$43.39
Angle splice bars, 100 lb	2.85
(F.o.b. basing points)	per net ton
Light rails (from billets)	\$49.18
Light rails (from rail steel)	49.18

	base per lb
Cut spikes	4.50¢
Screw spikes	6.40¢
Tie plate, steel	2.55¢
Tie plates, Pacific Coast	2.70¢
Track bolts	6.50¢
Track bolts, heat treated, to railroads	6.75¢
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 35¢.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	\$8.50	\$17.00
15-lb coating I.C.	9.50	19.00
20-lb coating I.C.	10.00	20.00

CLAD STEEL

Base prices, cents per pound

	Plate Sheet
Stainless-clad	
No. 304, 20 pct. f.o.b. Pittsburgh, Washington, Pa.	21.00* 22.00
Nickel-clad	
10 pct. f.o.b. Coatesville, Pa.	18.72
Inconel-clad	
10 pct. f.o.b. Coatesville	26.00
Monel-clad	
10 pct. f.o.b. Coatesville	24.96
Aluminized steel	
Hot dip, 20 gage, f.o.b. Pittsburgh	9.00

*Includes annealing and pickling.

WIRE PRODUCTS

To the dealer, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points	Pacific Coast Basing Points†
Standard, galvanized and coated nails	\$3.75	\$4.25
Cut nails, carloads	4.85	.....
base per keg		
Annealed fence wire	\$3.75	\$4.00
Annealed galv. fence wire	3.85	4.35
base column		
Woven wire fence*	79	97
Fence posts, carloads	74	91
Single loop bale ties††	72	97
Galvanized barbed wire**	89	99
Twisted barless wire..	79	89

*15 1/2 gage and heavier. **On 80-rod spools in carload quantities.

†Prices subject to switching or transportation charges.

††Add 50¢ a ton.

HIGH TENSILE, LOW ALLOY STEELS

base prices, cents per pound

Steel	Aldecor	Corten	Double Strength No. 1	Dynalloy	Hi Steel	Mayari R	Otis-coley	Yoloy	Y-50
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	American Rolling Mill
Plates.....	3.45	3.45	3.45	3.45	3.45	3.45	3.45	3.45	.....
Sheets									
Hot-rolled....	3.575	3.575	3.575	3.575	3.575	3.575	3.575	3.575	.....
Cold-rolled....	4.525	4.525	4.525	.....	4.525	4.525	4.525	4.525	5.225*
Galvanized....	.....	.....	.....	.....	.....	5.50	.....	.....	.....
Strip									
Hot-rolled									
Over 8-in....	3.60	3.60	3.60	.....	3.60	3.60	3.60	3.60	.....
6-in & under	3.70	3.70	3.70	.....	3.70	3.70	3.70	3.70	.....
Cold-rolled....	4.30	.....	4.30	.....	4.40	.....	4.30	4.30	5.00*
Commodity....	.....	.....	.....	.....	.....	.....	4.45	.....	.....
Shapes.....	.....	3.45	.....	.....	3.45	3.45	3.45	3.45	.....
Beams.....	.....	3.45	.....	.....	.....	3.45	.....	.....	.....
Bars									
Hot-rolled....	3.70	3.70	3.70	.....	.....	3.70	3.70	3.732†	.....
Cold rolled....	.....	.....	.....	.....	.....	.....	.....	4.382†	.....
Bar sh pce....	.....	3.85	.....	.....	3.85	3.85	3.85	3.85	.....
Billets, blooms, slabs (per gross ton)									
Structural.....	.....	.....	.....	.....	.....	.....	.....	\$74.65†	.....
Forging.....	.....	.....	.....	.....	.....	.....	.....	\$82.23†	.....

* 21 gage and lighter.

† Alloy extras apply.

‡ Add 0.379¢ for forging or heat treating grade.

PRICES

WELDED PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh district and Lorain, Ohio, mills

(F.o.b. Pittsburgh only on wrought pipe)
Base price—\$200.00 per net ton

Steel (buttweld)

	Black	Galv.
1/2-in.	60 1/2	48
3/4-in.	63 1/2	52
1-in. to 3-in.	65 1/2	54 1/2

Wrought Iron (buttweld)

1/2-in.	17 7/8	+4 1/2
3/4-in.	24 1/2	2 1/2
1-in. and 1 1/4-in.	28 1/2	9 1/2
1 1/2-in.	33	11 1/2
2-in.	32 3/4	11 3/4

Steel (lapweld)

1-in.	58	46 1/2
1 1/2-in. and 1 3/4-in.	61	49 1/2
2-in. to 6-in.	63	51 1/2

Wrought Iron (lapweld)

1-in.	24 1/2	4 7/8
1 1/2-in. to 1 3/4-in.	25 1/2	7 1/2
2-in.	28 1/2	11 1/2
4 1/2-in. to 8-in.	27	10 1/2

Steel (butt, extra strong, plain ends)

1/2-in.	58 1/2	47 1/2
3/4-in.	62 1/2	51 1/2
1-in. to 3-in.	64	54

Wrought Iron (same as above)

1/2-in.	18 7/8	+1 1/2
3/4-in.	25 1/2	4 1/2
1-in. to 2-in.	33	13

Steel (lap, extra strong, plain ends)

1-in.	56	45 1/2
1 1/2-in. and 3-in.	60	49 1/2
3 1/2-in. to 6-in.	63 1/2	53

Wrought Iron (same as above)

1-in.	28 1/2	8 3/4
2 1/2-in. to 4-in.	34	16 1/2
4 1/2-in. to 6-in.	32 1/2	14 1/2

On buttweld and lapweld steel pipe jobbers are granted a discount of 5 pct. On l.c.l. shipments prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lapweld and one point lower discount, or \$2 a ton higher on all buttweld.

BOILER TUBES

Seamless steel and lapweld commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft f.o.b. Pittsburgh, in carload lots

	Seamless	Hot-Drawn	Hot-Rolled	Lap-weld, Rolled
1 in. O.D. 13 B.W.G.	16.52	13.90	13.20	
2 1/2 in. O.D. 12 B.W.G.	22.21	18.70	17.67	
3 in. O.D. 12 B.W.G.	24.71	20.79	19.56	
3 1/2 in. O.D. 11 B.W.G.	31.18	26.25	24.68	
4 in. O.D. 10 B.W.G.	38.68	32.56	30.55	

(Extras for less carload quantities)

	Base	5 pct	10 pct	20 pct	30 pct	45 pct	65 pct
40,000 lb or ft and over							
30,000 lb or ft to 39,999 lb or ft							
20,000 lb or ft to 29,999 lb or ft							
10,000 lb or ft to 19,999 lb or ft							
5,000 lb or ft to 9,999 lb or ft							
2,000 lb or ft to 4,999 lb or ft							
Under 2,000 lb or ft							

CAST IRON WATER PIPE

	Per net ton
6-in. to 24-in., del'd Chicago	\$70.33
6-in. to 24-in., del'd New York	69.60
6-in. to 24-in., Birmingham	61.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles or Seattle for all rail shipment; rail and water shipment less	84.40
Class "A" and gas pipe, \$5 extra; 4-in. pipe is \$5 a ton above 6-in.	

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts

Add 18 pct for bolts up to 1/2 in. diam and 6 in. long. In larger sizes, add 15 pct.

Base discount less case lots

	Percent Off List
1/2 in. & smaller x 6 in. & shorter	65 1/2
9/16 & 5/8 in. x 6 in. & shorter	63 1/2
1 1/2 to 1 in. x 6 in. & shorter	61
1 1/2 in. and larger, all lengths	59
All diameters over 6 in. long	59
Lag, all sizes	62
Flow bolts	65

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

1/2 in. and smaller	62
9/16 to 1 in. inclusive	59
1 1/2 to 1 1/2 in. inclusive	57
1 1/2 in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts U.S.S. S.A.E.

Base discount less keg lots

7/16 in. and smaller	64
1/2 in. and smaller	62
1/2 in. through 1 in.	60
9/16 in. through 1 in.	59
1 1/2 in. through 1 1/2 in.	57
1 1/2 in. and larger	56

In full keg lots, 10 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts

	Consumer
Packages, nuts loose	71 and 10
In packages	71
In bulk	80
On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.	

Large Rivets

(1/2 in. and larger)

	Base per 100 Lb
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	\$4.75
F.o.b. Lebanon, Pa.	4.90

Small Rivets

(7/16 in. and smaller)

	Percent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	55 and 5

Cap and Set Screws

	Percent Off List
(In packages) Consumer	
Upset full fin, hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51
Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.	

FLUORSPAR

Maximum price f.o.b. consumer's plant, \$30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

	Base price per short ton
Effective CaF ₂ Content:	
70% or more	\$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

LAKE SUPERIOR ORES

(61.50% Fe, Natural Content, Delivered Lower Lake Ports)

	Per Gross Ton
Old range, bessemer	\$5.45
Old range, non-bessemer	5.30
Mesaba, bessemer	5.20
Mesaba, non-bessemer	5.05
High phosphorus	5.05

Prices are for ore shipped on and after June 24, 1946, and for ore covered by adjustable pricing agreements authorized by Order No. 8, RMPR 113.

These prices do not reflect the recent ICC increase in freight rates.

METAL POWDERS

Prices in cents per pound in ton lots, f.o.b. shipping point.

Brass, minus 100 mesh. 19 1/4¢ to 21 1/4¢	
Copper, electrolytic, 100 and 375 mesh	23 1/2¢ to 27 1/4¢
Copper, reduced, 150 and 200 mesh	22 1/2¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe	11¢ to 16¢
Swedish sponge iron, 100 mesh, c.i.f. N. Y., carlots, ocean bags	7.4¢ to 8¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots	4¢
Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots	6 3/4¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe 25¢ to 31¢	
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	17¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90¢ to \$1.71
Aluminum, 100, 200 mesh, carlots	25¢
Antimony, 100 mesh	20¢
Cadmium, 100 mesh	\$1.71
Chromium, 100 mesh and finer	\$1.31
Lead, 100, 200 & 300 mesh. 13 1/4¢ to 16¢	
Manganese, minus 325 mesh and coarser	44¢ to 61¢
Nickel, 150 mesh	51 1/2¢
Silicon, minus 325 mesh and coarser	26¢ to 55¢
Solder powder, 100 mesh. 8 1/2¢ plus metal	
Tin, 100 mesh	58 1/2¢
Tungsten metal powder, 98%-99%, any quantity, per lb.	\$3.61
Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb.	\$2.65
Under 100 lb.	\$2.90

COKE

	Net Ton
Furnace, beehive (f.o.b. oven)	
Connellsville, Pa.	\$8.75
Connellsville, Pa., hand drawn.	9.88
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	8.50

Foundry, Byproduct

Chicago, del'd	15.10
Chicago, f.o.b.	14.35
New England, del'd	16.04
Kearny, N. J., f.o.b.	14.40
Philadelphia, del'd	14.63
Buffalo, del'd	14.75
Portsmouth, Ohio, f.o.b.	12.85
Painesville, Ohio, f.o.b.	13.50
Erle, del'd	14.50
Cleveland, del'd	14.55
Cincinnati, del'd	14.60
St. Louis, del'd	15.10
Birmingham, del'd	12.85

†Except producers situated in states other than Missouri, Alabama or Tennessee, sellers may charge a maximum delivered price of \$15.60 in the St. Louis Mo., and East St. Louis, Ill., switching districts.

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Carloads Per 1000
Super-duty brick, St. Louis	\$81.00
First quality, Pa., Md., Ky., Mo., Ill., Ohio	65.00
First quality, New Jersey	70.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	59.00
Sec. quality, New Jersey	62.00
Sec. quality, Ohio	57.00
Ground fire clay, net ton, bulk	9.50

Silica Brick

Pennsylvania and Birmingham	\$65.00
Chicago District	74.00
Silica cement, net ton (Eastern)	11.50
Chicago	12.50

Chrome Brick

	Per Net Ton
Standard chemically bonded, Balt., Plymouth Meeting, Chester	\$54.00

Magnesite Brick

Standard, Balt. and Chester	\$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks	\$44.50
Domestic, f.o.b. Chewelah, Wash., in bulk	22.00
in sacks	26.00
Clinker (dead burned) dolomite, bulk, per net ton, f.o.b. York, Pa.	10.05
Midwest, add 10¢; Mo. Valley, add 20¢	

PRICES

WAREHOUSE PRICES

Delivered metropolitan areas, per 100 lb.

Cities	SHEETS			STRIP			Plates 1/4 in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot-Rolled (10 gage)	Cold-Rolled	Galvanized (24 gage)	Hot-Rolled 6 in. and Under	Over 6 in.	Cold-Rolled			Hot-Rolled	Cold-Finished	Hot-Rolled, A-8617-20	Hot-Rolled, A-8742-50 Ann.	Cold-Drawn, A-8617-20	Cold-Drawn, A-8742-50 Ann.
Philadelphia	\$3.774	\$5.139	\$5.249	\$4.314	\$4.214	\$5.084	\$3.875	\$3.937	\$4.114	\$4.584	\$8.287	\$7.387	\$7.884	\$8.784
New York	3.858	4.889	5.501	4.375	4.275	5.075	4.049	4.038	4.134	4.584	8.338	7.438	7.884	8.784
Boston	4.05	5.031	5.725	4.518	4.418	4.985	4.203	4.023	4.356	4.856	8.503	7.603	7.758	8.658
Baltimore	3.94	5.118	5.385	4.293	4.193	....	3.865	4.05	4.093	4.543	....	....	....	....
Norfolk	4.037	....	5.882	4.577	4.477	....	4.282	4.303	4.377	4.677	....	....	....	....
Chicago	3.475	4.425	5.40	3.95	3.85	4.90*	3.80	....	3.75	4.20	6.06	7.15	7.20	8.30
Milwaukee	3.833	4.583	5.558	4.108	4.008	5.058*	3.958	3.958	3.908	4.358	8.308	7.408	7.458	8.558
Cleveland	3.575	....	5.347	3.95	3.85	....	3.85	3.88	3.80	4.20	6.277	7.377	7.20	8.30
Buffalo	3.575	4.625	5.20	4.211	4.111	....	4.961	3.921	3.85	3.80	4.20	6.05	7.15	7.20
Detroit	3.71	4.76	5.526	4.085	3.985	....	4.96	3.935	3.987	4.285	6.466	7.566	7.585	8.685
Cincinnati	3.671	4.721	5.296	4.046	3.946	....	5.002	3.952	3.983	4.302	6.441	7.541	7.602	8.702
St. Louis	3.643	4.593	5.622	4.118	4.018	5.222	3.968	3.988	3.918	4.522	6.472	7.572	7.622	8.722
Pittsburgh	3.575	4.625	5.20	3.95	3.85	4.70	3.85	3.85	3.80	4.20	6.05	7.15	7.20	8.30
St. Paul	3.817	4.767	5.666	4.292	4.192	5.000	4.142	4.142	4.092	4.592	....	6.322	7.952	8.052
Duluth	3.817	4.767	5.666	4.292	4.192	....	4.142	4.142	4.092	....	6.472	8.672	....	....
Omaha	4.045	5.72	6.00	4.52	4.42	....	4.37	4.37	4.32	4.945	....	....	....	....
Indianapolis	3.775	4.625	5.40	4.15	4.05	5.03	3.92	3.92	3.87	4.47	6.17	....	7.32	....
Birmingham	3.675	....	5.20	4.05	3.95	....	3.80	3.80	3.75	4.954	6.414	7.514	7.564	8.614
Memphis	4.221	....	5.746	4.586	4.486	....	4.346	4.346	4.296	4.821	....	....	....	....
New Orleans	4.358*	5.40*	5.884	4.734	4.634	....	4.484	4.484*	4.434*	5.175	....	....	....	....
Los Angeles	4.685	5.635	6.585	5.335	5.235	....	4.484	4.484	4.434	5.175	....	....	....	....
San Francisco	4.435	5.035	5.585	4.885	4.785	....	4.335	4.335	4.285	5.175	....	....	....	....
Seattle	4.905*	7.305*	8.235	6.435	6.335	....	5.035*	4.735*	4.635*	6.285	7.735*	8.735*	....	9.585*
Portland	4.905*	....	6.435	5.135	5.035	....	5.035*	4.735*	4.635*	6.015	7.735	8.885	....	....
Salt Lake City	4.81	....	6.70	5.94	5.84	....	5.29	5.29	5.19	6.49	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities; bars, 1500 lb base.

ALLOY BARS: 1000 to 39,999 lb.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 450 to 3749 lb; (4) 800 to 4999 lb; (5) 800 to 10,000 lb; (6) 2000 lb and over; (7) 8500 lb and over; (8) 1000 lb and over.

(*) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

* Add 29.1¢ for sizes not rolled in Birmingham.

** City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

PIG IRON PRICES

Per gross ton.

BASING POINT PRICES						DELIVERED PRICES (BASE GRADES)							
Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.	Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	31.00	31.50	32.00	32.50	....	Boston	Everett*	\$0.50 Arb.	29.50	30.00	30.50	31.00	....
Birdsboro	31.00	31.50	32.00	32.50	36.00	Boston	Birdsboro-Steelton	4.47	....	....	....	....	40.47
Birmingham	25.50	26.50	....	31.50	....	Brooklyn	Bethlehem	2.78	33.78	34.28	34.78	35.28	....
Buffalo	30.00	30.50	31.00	31.50	36.00	Brooklyn	Birdsboro	3.28	....	....	....	....	39.28
Chicago	30.00	30.50	30.50	31.00	....	Canton	Clev. Ygstr. Sharpvil.	1.54	31.84	32.04	32.04	32.54	....
Cleveland	30.00	30.50	30.50	31.00	....	Canton	Buffalo	3.55	....	....	....	....	39.55
Detroit	30.00	30.50	30.50	31.00	....	Cincinnati	Birmingham	4.30	29.80	31.18	....	....	....
Duluth	30.50	31.00	31.00	31.50	....	Cincinnati	Hamilton	1.24	....	29.74	....	....	....
Erie	30.00	30.50	31.00	31.50	....	Cincinnati	Buffalo	4.89	....	....	....	....	40.89
Everett*	29.00	29.50	30.00	30.50	....	Jersey City	Bethlehem	1.70	32.70	33.20	33.70	34.20	....
Granite City	30.00	30.50	30.50	31.00	....	Jersey City	Birdsboro	2.16	....	....	....	....	38.16
Hamilton	28.00	28.50	28.50	....	....	Los Angeles	Provo	5.25	31.25	31.75	....	....	....
Neville Island	30.00	30.50	30.50	31.00	....	Los Angeles	Buffalo	16.33	....	....	....	....	52.33
Provo	30.00	30.50	....	....	....	Mansfield	Cleveland-Toledo	2.16	32.16	32.66	32.66	33.16	....
Sharpsville	30.00	30.50	30.50	31.00	....	Mansfield	Buffalo	3.74	....	....	....	....	39.74
Sparrows Point	31.00	31.50	....	....	....	Philadelphia	Swedeland	0.93	31.93	32.43	32.93	33.43	....
Steelton	31.00	....	....	....	36.00	Philadelphia	Birdsboro	1.38	....	....	....	....	37.38
Swedeland	31.00	31.50	32.00	32.50	....	San Francisco	Provo	5.25	35.25	35.75	....	....	....
Toledo	30.00	30.50	30.50	31.00	....	San Francisco	Buffalo	16.33	....	....	....	....	52.33
Youngstown	30.00	30.50	30.50	31.00	....	Seattle	Provo	5.25	31.25	31.75	....	....	....
						Seattle	Buffalo	16.33	....	....	....	....	52.33
						St. Louis	Granite City	0.50 Arb.	30.50	31.00	31.00	31.50	43.86
						St. Louis	Buffalo	7.86	....	....	....	....	....

* All prices nominal, furnace is not in operation.

(1) Struthers Iron & Steel Co., Struthers, Ohio, charges 50¢ per ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Charcoal pig iron base prices for Lyles, Tenn., and Lake Superior furnaces, \$33.00 and \$34.00, respectively. Newberry Brand of Lake Superior charcoal iron \$39.00 per g.t., f.o.b. furnace. Delivered to Chicago, \$42.34.

High phosphorus iron sells at Lyles, Tenn., at \$28.50.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each

0.50 pct manganese content in excess of 1.80 pct. 32 per ton extra may be charged for 0.8 to 0.75 pct nickel content and \$1 per ton extra for each additional 0.25 pct nickel.

Silvery iron, silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—\$36.00; f.o.b. Buffalo—\$37.25. Add \$1.00 per ton for each additional 0.50 pct Si. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add \$1.00 per ton for prices of comparable analysis

FERROALLOY PRICES

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	\$135.00
Less ton lots (packed)	148.50
F.o.b. Pittsburgh	139.50
\$1.70 for each 1% above 82% Mn; penalty, \$1.70 for each 1% below 78%.	
Briquets—cents per pound of briquet, freight allowed, 66% contained Mn.	
Eastern Central Western	
Carload, bulk	6.05 6.30 6.60
Ton lots	6.65 7.55 8.55
Less ton lots	6.80 7.80 8.80

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

16-19% Mn	19-21% Mn
3% max. Si	3% max. Si
Carloads	\$39.00 \$40.00
F.o.b. Pittsburgh, Chicago	40.00

Manganese Metal

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.	
Carload, bulk	30
L.c.l. lots	32

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32
Ton lots	34
Less ton lots	36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.10% max. C, 0.06% P, 90% Mn	21.00	21.40	21.65
0.10% max. C	20.50	20.90	21.15
0.15% max. C	20.00	20.40	20.65
0.30% max. C	19.50	19.90	20.15
0.50% max. C	19.00	19.40	19.65
0.75% max. C			
7.00% max. Si	16.00	16.40	16.65

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05
Ton lots	6.70
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet.	5.80
Ton lots	6.30
Less ton lots	6.55

Silvery Iron (electric furnace)

Si 14.01 to 14.50%, \$53.25 f.o.b. Keokuk, Iowa; \$50.00 f.o.b. Jackson, Ohio; \$51.25 f.o.b. Niagara Falls. Add \$1.00 per ton for each additional 0.50% Si up to and including 18%. Add \$1.00 per ton for low impurities, not to exceed: P—0.05%, S—0.04%, C—1.00%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots, packed.

	Eastern	Central	Western
96% Si, 2% Fe.	13.10	13.55	16.50
97% Si, 1% Fe.	13.45	13.90	16.80

Ferrosilicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si.

	Eastern	Central	Western
Carload, bulk	3.60	3.75	3.90
Ton lots	4.15	4.55	4.60
Less ton lots	4.40	4.80	4.85

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
60% Si	7.05	7.50	7.65
75% Si	8.55	8.70	9.25
80-90% Si	9.50	9.65	10.15
90-95% Si	11.80	11.95	12.40

Ferrochrome

(65-72% Cr, 2% max. Si)
Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	23.00	23.40	24.00
0.10% C	22.50	22.90	23.50
0.15% C	22.00	22.40	23.00
0.20% C	21.50	21.90	22.50
0.50% C	21.00	21.40	22.00
1.00% C	20.50	20.90	21.50
2.00% C	19.50	19.90	20.50
66-71% Cr			
4-10% C	14.50	14.90	15.00
62-66% Cr			
5-7% C	15.05	15.45	15.55
Briquets—contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.			
Eastern Central Western			
Carload, bulk	9.20	9.60	9.90
Ton lots	9.80	10.30	11.80
Less ton lots	10.10	10.60	12.10

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low-carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N. High-carbon type: 66.71% Cr, 4-5% C, 0.75% N. Add 5¢ per lb to regular high-carbon ferrochrome price schedule.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	15.60	16.00	16.10
Ton lots	16.65	17.30	18.50
Less ton lots	17.30	17.95	19.15

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

	Eastern	Central	Western
Carload	20.00	20.40	21.00
Ton lots	21.00	21.65	22.85
Less ton lots	22.00	22.65	23.85

Chromium Metal

Contract prices, cents per lb, chromium contained, carload, f.o.b. shipping point, freight allowed. 97% min. Cr, 1% max. Fe.

	Eastern	Central	Western
0.20% max. C	83.50	85.00	86.25
0.50% max. C	79.50	81.00	82.25
9.00% min. C	79.50	81.00	82.25

Chromium—Copper

Contract price, cents per pound of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si.

Shot or ingot 45¢

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	13.00	13.50	15.55
Ton lots	14.50	15.25	17.40
Less ton lots	15.50	16.25	18.40

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	15.50	16.00	18.05
Ton lots	16.50	17.35	19.10
Less ton lots	17.00	17.85	19.60

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1¢ for central zone; 5¢ for western zone.

	Cast	Turnings	Distilled
Ton lots	\$1.35	\$1.75	\$4.25
Less ton lots	1.60	2.00	5.00

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

	Eastern	Central	Western
Ton lots	12.00	12.75	14.75
Less ton lots	12.50	13.25	15.25

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

	Eastern	Central	Western
Ton lots	11.75	12.50	14.50
Less ton lots	12.25	13.00	15.00

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe.

	Eastern	Central	Western
Ton lots	12.00	12.85	14.60
Less ton lots	12.50	13.35	15.10

Other Ferroalloys

Ferrotungsten, standard, lump or ¼X down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained T, 5 ton lots, freight allowed. \$1.80

Ferrovandium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.

Openhearth 22.70

Crucible 22.80

High speed steel (Primos) 22.90

Vanadium pentoxide, 88-92% V₂O₅, technical grade, contract basis, per pound contained V₂O₅ 11.10

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb. 22.30

Ton lots 22.30

Less ton lots

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo 95¢

Calcium molybdate, 40-45%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo 80¢

Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo 80¢

Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo 80¢

Ferrotitanium, 40-45%, 0.10% C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti 11.23

Less ton lots 11.30

Ferrotitanium, 20-25%, 0.10% C max., ton lots, per pound contained Ti 11.35

Less ton lots 11.40

High-carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads 1142.50

Ferrophosphorus, 18%, electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with \$3 unitage freight equalized with Rockdale, Tenn., per gross ton 58.50

Ferrophosphorus, Electrolytic, 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., \$3 unitage freight equalized with Nashville, per gross ton 75.00

Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.

Carload lots 14¢

Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy 4.60¢

Carload, bulk 6.25¢

Alsilfer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Niagara Falls, carload 6.75¢

Ton lots

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound 8.50¢

Car lots 9.25¢

Ton lots 9.75¢

Less ton lots

Boron Agents

Contract prices per pound of alloy f.o.b. shipping point, freight allowed

Ferroboration, 17.50% min. B, 1.50% max Si, 0.50% max. Al, 0.50% max. C.

	Eastern	Central	Western
Less ton lots	\$1.30	\$1.3075	\$1.329

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

	Eastern	Central	Western
Ton lots	\$1.89	\$1.903	\$1.935
Less ton lots	2.01	2.023	2.055

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots \$2.10 \$2.1125 \$2.1445

Silicaz No. 3, contract basis, f.o.b. plant, freight allowed, per pound of alloy.

carload lots 25¢

Ton lots 26¢

Silvaz No. 3, contract basis, f.o.b. plant, freight allowed, per pound of alloy.

Carload lots 58¢

Ton lots 59¢

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.

No. 1 87.50

No. 6 60¢

No. 79 45¢

Bortram, f.o.b. Niagara Falls

Ton lots, per pound 45¢

Less ton lots, per pound 50¢

Sampling Techniques

(CONTINUED FROM PAGE 75)

where it is known a priori that non-normal distribution exists to a marked degree, such as might be caused by unilateral tolerances, then extreme care should be taken to use statistics based on more appropriate distribution curves.⁷ In this way greater significance can be given the statistics, and more accuracy built into the sampling interpretation system. Should a test distribution curve indicate that the product does not have a normal distribution, caution should be taken in the prediction of defectives. An attempt to apply sampling theory should not be made in each instance by one who does not understand how to deal with such factors and to interpret properly the mathematical results.

In the light of some technical considerations, each sample should contain at least four units.¹⁰ However, samples of 5 or 10 have distinct advantages of simplified computations. There is no upper limit on the size of the sample. As a general rule it is well to remember that small samples having been taken at frequent intervals are more sensitive to changes than large samples.

A good method to obtain a suitable sample size is to select a sample size n , so that $\bar{p}n$ is equal to 4 or more where \bar{p} is the average fraction defective and n is the sample size, to provide the control chart, \bar{X} and σ are plotted.¹¹ For example, if $\bar{p} = 0.05$, then a sample of 80 should be used. In this case it should be further noted that four samples of 20 each taken 15 minutes apart will produce better control than a single sample of 80 taken once an hour. The point is that at least 80 units should be examined before any conclusions are drawn about the product.

If instead of \bar{X} and σ , it is decided to chart \bar{X} and R , the range, the sample size should be no greater than 10, since beyond this value the range is not very efficient as an indicator of rejects due to assignable causes.¹²

In all this discussion¹³ of control sampling that much of the efficiency of the system is dependent on its temporal aspects, the samples must be made periodically and on time and the results plotted, observed and analyzed in the order of their occurrence.

In analysis sampling a new purpose is met, the determination of the frequency distribution curve or fraction defective of a parent population from which a randomly selected sample is taken. The intent is not that of acceptance or control, although analysis sampling is an efficient method of doing both. Perhaps the following example will offer some clarification.

Assuming a lot of 50,000 units, obviously no amount of sampling information made at this time can be used to control the quality of a product already made. It is either good or it is not and all the juggling in the world won't change that fact. To determine the acceptability on a pure yes or no basis, that is, fraction defective based on the logic and implications of AOQL, consumer's risk, producer's risk, and lot tolerance percent defective, one merely consults the Dodge-Romig tables for proper sample size and acceptable number of defectives. On the other hand, a satisfactory sample for analyzing the nature of the 50,000 pieces would depend on the order of accuracy and the a priori knowledge of the fraction defective. If for a sample of 50,000 pieces a 0.9 probability that the observed fraction defective will be within ± 2 pct of the true frac-

tion defective is 0.07, a sample of at least 230 pieces should be taken.¹⁴

If the purpose of the analysis is to determine the shape of the frequency distribution it would require a sample of the order of 1000 to 5000 units.¹⁵ A very rough method of estimating the efficacy of two samples is to remember that dependability of the sample is in proportion to the square root of the sample size. For example, if information is sought on how much better a sample of 1600 units is than one of 1000, the ratios of their square roots are taken, i.e.,

$$\sqrt{1600} / \sqrt{1000} = \frac{40}{31.6} \text{ or } \frac{1.27}{1}$$

In other words, by increasing the sample size 60 pct, its ability to represent the parent population is increased by only 27 pct.¹⁶ This rule applies only to samples made from large populations.

Thus far the discussion has been concerned with a lot about which there is no knowledge of the production conditions, i.e., it is not known whether it was made under controlled or uncontrolled conditions. If, a priori, it is known that the product was controlled, a random sample of about 250 to 500 pieces is an adequate sample for the analysis of most large lots.

One suitable procedure with lots about which there is no a priori information, is to construct a suitable frequency curve and evaluate the statistics X , σ , k , and B_2 ¹⁷ based on a random sample of 500 units,

X is the average value of X , the value or measurement of a single unit

σ is the standard deviation

k is the skewness of the curve

B_2 is the kurtosis or flatness of the curve

Then a second random sample of 1000 units is taken and statistics \bar{X} , σ , k , and B_2 ^{***} are independently re-computed. If those statistics are within a few points

*** For normal distributions $K=0$ and $B_2=3$.

of those computed on the smaller sample, then it is known for the future that a sample of 500 pieces can be used to obtain the frequency distribution of this material, provided the conditions of its manufacture remain essentially the same. Although this is a crude technique at best, it does find a sample size which, if increased, fails to be appreciably more representative of the parent population or grand lot than the original sample. This difference can be statistically examined for its significance using the familiar chi-square test.¹⁸

To restate the result, it can be assumed that the sample size is large enough to correctly represent the grand lot, if when the sample is increased, the statistics remain practically unchanged.

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- L. E. Simon, op. cit. p. 96.
- Morris Miles Blair, op. cit. p. 321.
- For computation of k and B_2 consult W. A. Shewhart, op. cit. No. 9, p. 74-77.
- W. A. Shewhart, op. cit. p. 205-210.

Says Mexican Market For U. S. Exports Will Continue to Increase

Chicago

••• Alfredo Guijarro of Mexico City, predicted on his visit to Chicago Nov. 29, that Mexico, which is enjoying a high standard of living stimulated by the war, will continue a progressive and prosperous era under its new government. Mr. Guijarro, who heads Distribuidora Norge, South America, in Mexico City and also distributor for Borg-Warner International auto service products, considers the future appliance market in Mexico to be at least 2½ to 3 times as great as any prewar year.

According to Mr. Guijarro the railroads are now carrying from four to five times the amount of freight traffic of 1941 and the rising consumer market seems certain to hold. New car registrations for 1946 will total 30,000, approximately double the yearly prewar number. He added that a big increase has been noted in demand for rubber, steel and drugs manufactured both in Mexico and this country.

President Aleman is said to have an outstanding cabinet comprised of men selected for their merits and the new government is going to be very progressive. The schedule is to industrialize and to produce more food and Mexico is looking hopefully to the party change

in the United States to stabilize business for the better. During the war, Mr. Guijarro said, that his country experienced little if any shortages in food, tires, gas and cotton goods. Prices are high today but there has been a noticeable trend downward recently, he added, forecasting that a further easing in the peak of real estate values would come in the next six to eight months.

The freight car embargo which necessitated a long detention of cars was easing before the American coal strike and the congestion at the border collecting areas had almost disappeared. The visitor revealed that Mexico is expanding enormously in the building of highways and when the more important roads are completed there will be a considerable increase in freight trucking to supplement the somewhat meager rail hauling facilities that are now available.

British Auto Makers To Get More Sheet, Strip

London

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As yet no definite indication has been given of how much more steel is likely to be allocated by the Ministry of Supply.

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136B—THE IRON AGE, December 12, 1946

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Washington

••• Can the United States do business with Russia?

The United States not only can do business with Russia, but is doing so at an ever increasing rate, according to Ernest C. Ropes, Chief of the USSR Division of the Dept. of Commerce. In a broadcast last week, one of a series of transcribed programs distributed by Public Service Transcriptions, Inc., Mr. Ropes said that during the first 6 months of 1946 the United States exported \$219 million worth of goods to the Soviet Union and imported \$57 million from there.

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Henry Ware, Mr. Ropes' assistant, who also participated in the program, said that excavators, cranes, machine tools, and electrical equipment are our principal exports to Russia.

Westinghouse to Build Giant Electric Motors

••• Four 65,000 hp electric motors, each exceeding by more than 50 pct the capacity of the most powerful single ac motor now in existence, will be built by Westinghouse Electric Corp. for pumping the water from the Grand Coulee dam into the semi-arid regions of south-central Washington.

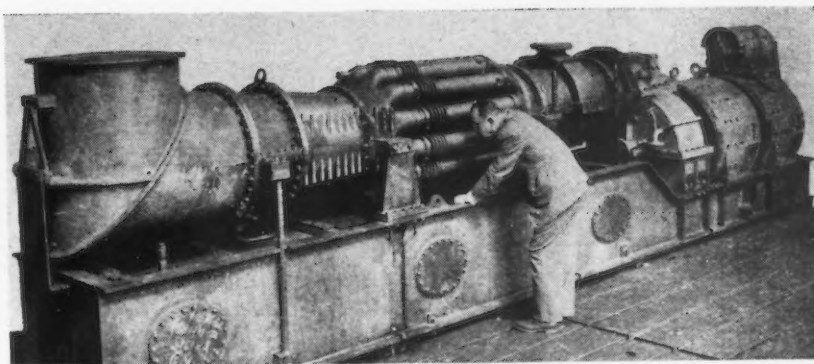
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Development of New 2000-hp Gas Turbine is Disclosed

New York

• • • An experimental 2000-hp gas turbine generator set that weighs only 19 lb per hp and starts in 1½ min or less has been developed for industrial, central station, marine, and locomotive applications. Occupying but 0.25 cu ft per hp, its light weight, compactness, and quick starting and loading response are said to make possible among other things a gas-turbine-electric locomotive less than half the length and two-thirds the weight of its equivalent in a diesel-electric.

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Burning No. 6 (bunker "C") fuel oil to compensate economically for an expected thermal efficiency of its simple open cycle of 20 pct at full load, the gas turbine generator set operates at a top temperature of 1350°F—the maximum practical temperature using currently available materi-

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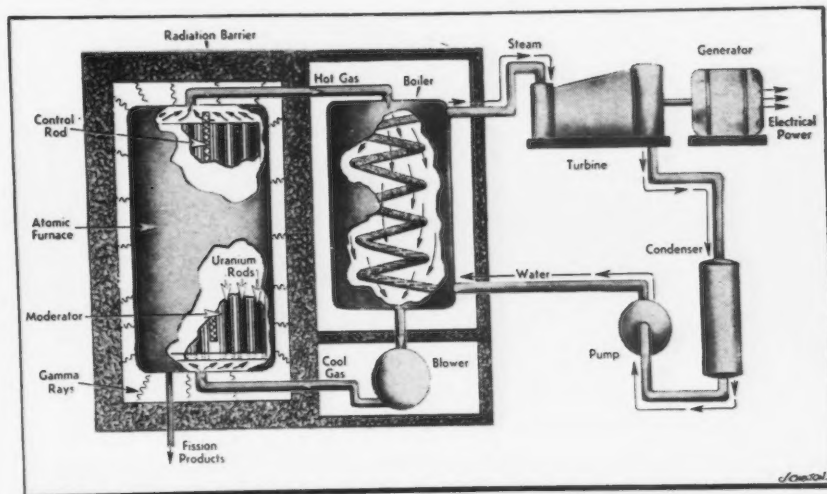
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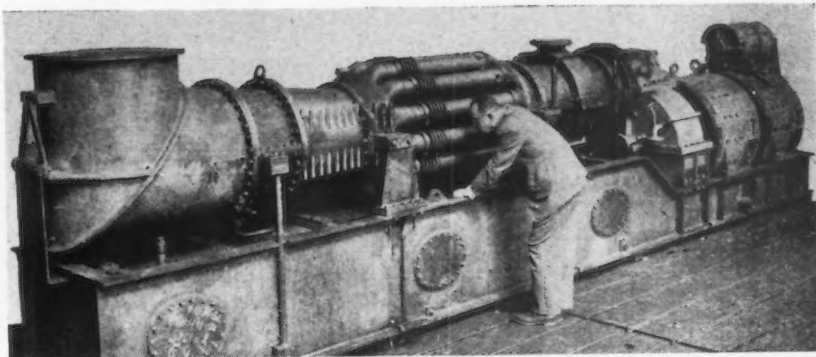
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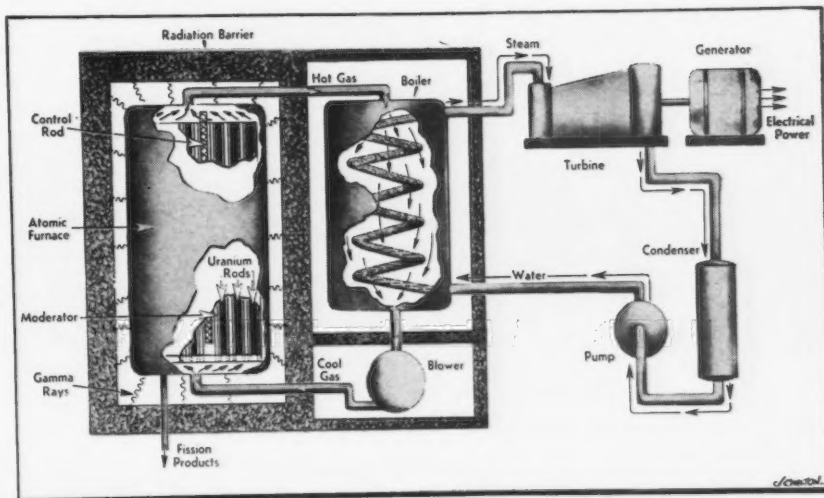
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These Two are Revolutionizing



THE
CLARK
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PALLET

THE
CLARK
FORK
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WHAT A TEAM! Four-way pallets that invite savings in time and space (whether box-car, highway truck, warehouse or on the line) by uniform, unit-loads. Fork lift trucks that insure these savings by rapid movement and ceiling-high tiering (at the same time reducing accidents).

That's "The CLARK Method" . . . but only part of it—let a Clark Field Engineer tell you more about this amazing team (and method) that's cutting costs . . . boosting efficiency—assuring profits! Write today.

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TOWING, DUMP AND
SHOVEL TRACTORS
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DRILLS
& GEARS

ELECTRIC STEEL CASTINGS
METAL SPOKE WHEELS
AXLES & HOUSINGS
TRANSMISSIONS

Prices on CLARK products will not be advanced in excess of increased costs.

Declares Outlook For Sale of U.S. Products In Europe Is at Peak

Chicago

• • • According to J. W. DeLind, Jr., president of Borg-Warner International Corp., the outlook for sales of American manufactured products in the presently unoccupied countries of Europe stands at the greatest peak in history. Mr. DeLind made this observation on his return from a 3-months' survey of markets in Holland, Belgium, France, Spain, Portugal, Switzerland, England and the Scandinavian countries.

"At the moment," he said, "considerable difficulty is being encountered in the actual placing of commitments in this country due to overseas governmental restrictions in connection with the dollar exchange. This condition is expected to improve in most of the countries visited within a few months, or upon the terms of the British loan becoming operative."

Mr. DeLind qualified this statement by adding that in Switzerland and Sweden, neither of which was directly involved in the war, most cities seem to be literally bulging with sterling and dollars. Mr. DeLind did not mention the experience of other recently returned observers that Switzerland in particular is not anxious to acquire American dollars.

While labor costs throughout Europe are considerably less than half of those existing in this country, Mr. DeLind believes that American manufacturers, by maintaining a flexible policy in respect to these markets, should be able to maintain and increase their portion of sales of products which are typically American.

"There is a noticeable new spirit of willingness on the part of the British manufacturers," Mr. DeLind asserted, "to cooperate on matters of mutual interest on world wide distribution."

Mr. DeLind said that while he found plenty of food throughout his European tour, he noticed an extreme lack of goods ranging from clothing to automobiles and refrigerators. The food situation in Britain is probably the worst of all places visited and practically everything in England, Mr. DeLind said, is rationed.

DANLY

Gap-Frame Presses

DANLY
102-213-32-34
GAP-FRAME PRESS



RUGGED CONSTRUCTION

All-steel, Danlyweld Construction. Intermediate continuous structural members extend up through the back of the frame, reducing deflection throughout the entire length of the bed.



MECHANICAL ACCURACY

2 Suspension Points—Eccentric Gear Drive
—Extra-long, fully adjustable gibs.



PRESSURE OIL SPRAY LUBRICATION

All gears and internal moving parts lubricated in a spray of filtered oil.



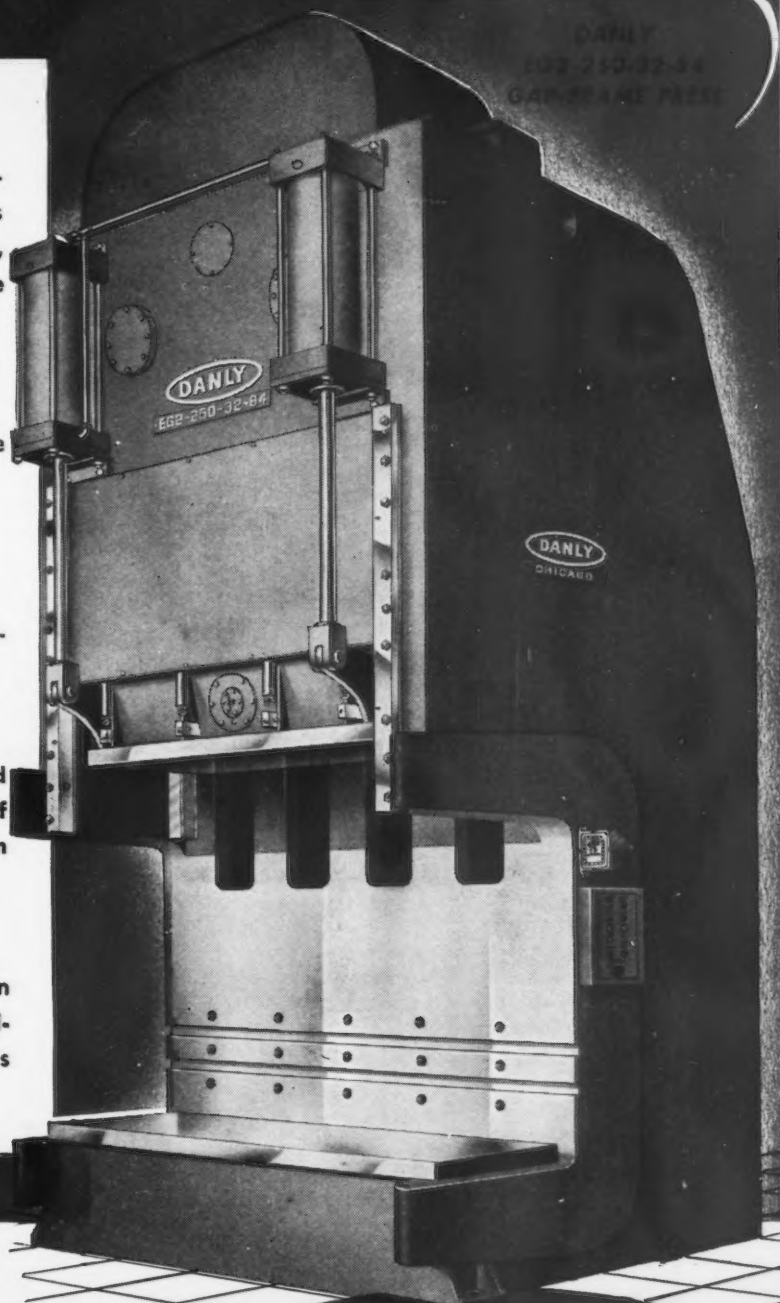
AIR-FRICTION CLUTCH

Solenoid controlled—provides smooth and fast engagement and disengagement of driving machinery without delay for cam rotation.



MODERN DESIGN FEATURES

Electric Stroke Indicator and Push-button Control Panel—Motor-Driven Stroke Adjustment are standard equipment on this model.

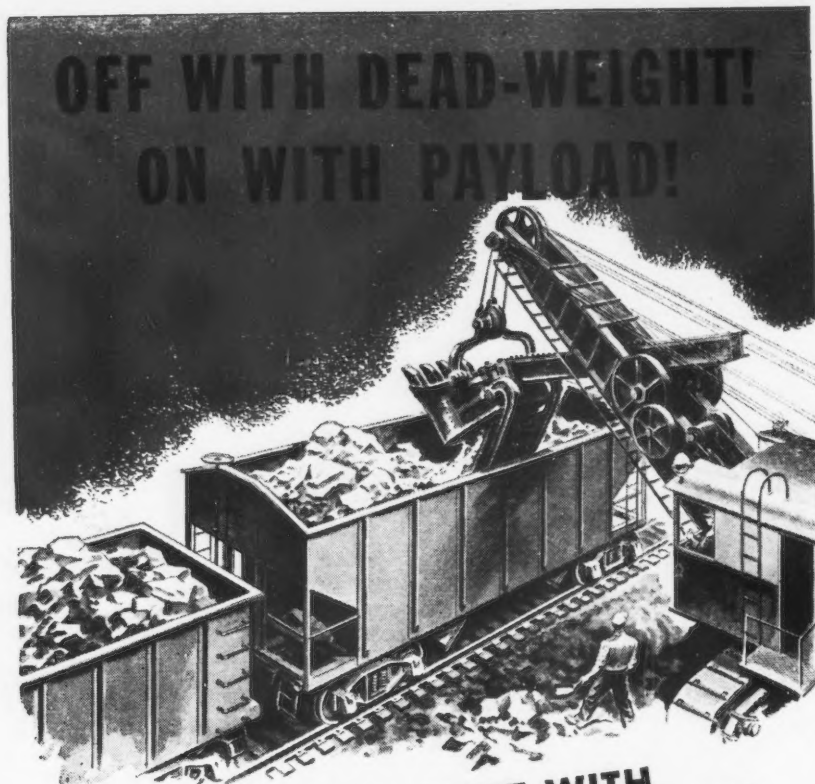


The 250 ton, 2 point Eccentric Gear Gap-Frame Press shown is of all-steel Danlyweld construction. Gearing and driving members are completely enclosed within the frame. This press has a 14" stroke—operates at 20 strokes per minute. Bed area is 32" x 84". Shut height—54".

THE PRESS for MODERN PRODUCTION

DANLY MACHINE SPECIALTIES, INC.,

2100 South 52nd Avenue
Chicago 50, Illinois



THESE CARS ARE BUILT WITH AW DYNALLOY

It's just plain common sense. Reduce dead-weight and you've more room for the payload. AW Dynalloy makes it possible to design stronger structures or to reduce dead-weight as much as 40% without any reduction in strength or safety. AW Dynalloy has excellent cold forming properties and shows superior resistance to abrasion, impact and fatigue. Especially valuable when reducing size of sections is AW Dynalloy's resistance to atmospheric corrosion which is 4 to 6 times plain carbon steel or approximately twice that of copper bearing steel. These properties combine with excellent weldability to make AW Dynalloy the most economical steel for building trucks, buses,

freight cars, portable and stationary structures.

Write for your copy of our New Folder D-12. It contains maximum sizes and helpful information.

PHYSICAL PROPERTIES of AW DYNALLOY
Yield Point P.S.I. Minimum 50,000
Tensile Strength P.S.I. 65-80,000
Elongation in 2", % Minimum 25.0
*Elongation in 8", % Minimum 1,500,000

T.S. 45,000
Endurance Limit p.s.i. 45,000
Specimen Cold Bend, 180° @ diameter = 1 thickness

*For material under 5/8" to 3/4" inclusive, deduct 1.25 per cent for each decrease of 1/8" below 5/8" from the percentage of elongation in 8" specified above.

AW DYNALLOY

THE HIGH STRENGTH LOW ALLOY STEEL

A Product of ALAN WOOD STEEL COMPANY
CONSHOHOCKEN, PENNA.

NEWS OF INDUSTRY

Reports Third Quarter Price Rise of 4 Pct In Machinery, Equipment

Washington

••• A general price rise of approximately 4 pct for general and auxiliary machinery and equipment during the third quarter 1946 has been reported by the Bureau of Labor Statistics.

All types of machinery in the BLS index rose during the third quarter with the exception of lubricating equipment which registered a slight decrease.

Largest increase was noted in heat exchanges and water and air coolers which rose more than 8 pct. The October index of prices of major items as compared with the 1945 average is shown in the accompanying table.

Price rises of from 2 to 4 pct were reported during the quarter for cutting tools and machine tool attachments, industrial heat treating furnaces, materials handling equipment and scientific instruments.

October prices were 17.5 pct above the August 1939 levels, the BLS said, and added that most of this increase had been recorded since January of this year.

Index Numbers of Prices Of General and Auxiliary Machinery and Equipment.

(August 1939 = 100)

	Average for Year	
	1945	October*
Gasoline and diesel engines	107.3	122.8
Air compressors	100.4	115.5
Pumps (power driven)	103.3	116.9
Mechanical measuring and testing instruments	109.2	123.7
Scientific instruments	100.1	117.3
Material handling equipment	103.7	117.1
Fans and blowers....	110.9	122.2
Mechanical stokers, power type	103.5	127.0
Cutting tools and machine tool attachments	100.0	118.1
Mechanical power transmission equipment	97.9	111.4
Gas welding and cutting equipment	99.9	106.2
Lubricating equipment	101.1	111.6
Industrial heat treating furnaces	101.4	115.9

* Preliminary.

CLEARING SD-660 PRESS



SPECIFICATIONS

Bed Area — 40" front to back by 60" right to left
Stroke — 10"
Slide Adjustment — 10" by motor
Shut Height — 28"
Speed — 23 strokes per minute
Diameter of Crankshaft at Main Bearings — 6"



Choosing the Press to Fit the Job

Where the stamping job to be done places only ordinary demands on the press equipment, a Clearing double crank press of the type illustrated here makes an excellent investment. Clearing developed this new family of presses in addition to its well known eccentric gear type machines because they are naturally less costly to build and will perform certain classes of work equally well.

The Clearing SD-660 press is being used, for example, by leading refrigerator and electrical appliance companies in the production of parts having medium depth of draw.

Extraordinary accuracy for presses of this type is assured by Clearing construction. The one-piece welded frame provides perfect distribution of stresses so as to maintain relationships between slide, dies and bed with minimum variation under severe loads. The two cranks distribute the load over a relatively large bed area without any tendency for the slide to "rock." The long, adjustable gibs provide assurance that slide and bed will be constantly parallel under all conditions.

Clearing engineers can quickly tell you whether the demands of your work can best be filled by a crankshaft type press. Since Clearing builds both crankshaft and eccentric drive presses as well as hydraulics, we are in a position to advise you impartially as to the press equipment best suited to your needs. Ask us to help you.

CLEARING

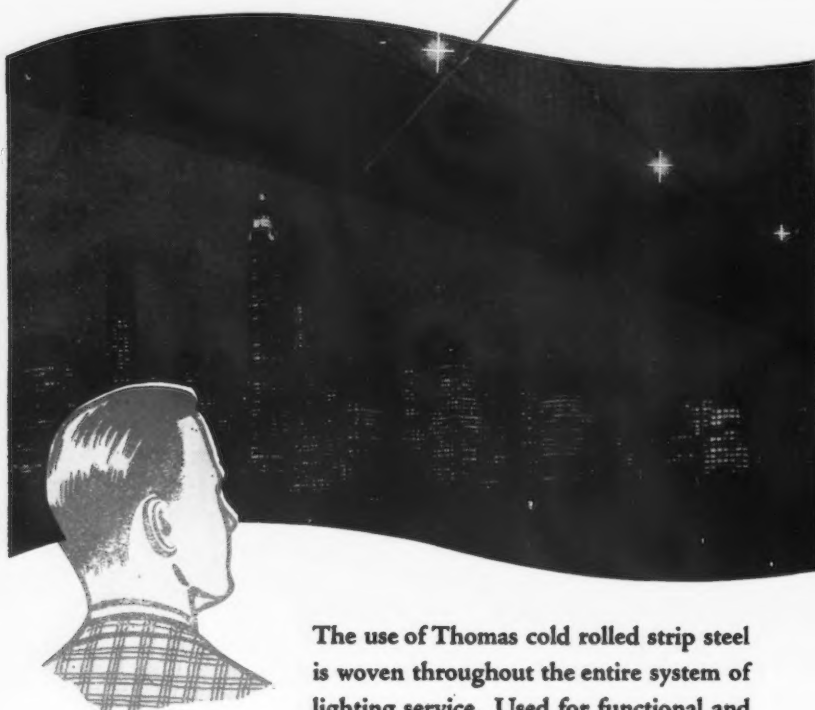
THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION

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EVERY LIGHTING SERVICE INCLUDES THOMASTRIP SOMEWHERE



The use of Thomas cold rolled strip steel is woven throughout the entire system of lighting service. Used for functional and decorative purposes, designers and production men have placed ThomaStrip in cables, switches, wall plugs, reflectors, lamps, and fixtures. In these electrical products and many others coated and uncoated finishes are used.



... because ThomaStrip shows cost reduction and product improvement for many manufacturers. It extends the versatility of steel because it is available in a wide range of coatings, special tempers and analyses ... in electro-coated zinc, copper, nickel, and brass ... hot dipped tin and solder ... lacquer coated in colors ... uncoated precision strip ... carbon and alloy specialties.

THE THOMAS STEEL COMPANY

Cold Rolled Strip Steel Specialists
WARREN, OHIO

Our Engineers will be glad to work with you



NEWS OF INDUSTRY

Reports Production Of Electrolytic Manganese From MRC Stockpiles

Washington

... Stockpiles of manganese ores acquired by the Metals Reserve Co. at three western localities are suitable for the production of electrolytic manganese by a Bureau of Mines process developed in recent years, Dr. R. R. Sayers, Director of the Bureau, announced.

In tests at the Bureau's pilot plant at Boulder City, Nev., electrolytic manganese was produced from representative samples of government-owned manganese ores stockpiled at Deming, N. M., and Cushman, Ark., and at Philipsburg, Mont., Dr. Sayers stated.

Although some differences were reported in the results from the three ores, electrolytic manganese was made successfully from each by the standard methods of roasting, leaching, purification and electrolysis, according to a Bureau publication describing the Boulder City experiments.

Prepared by J. H. Jacobs and H. C. Fuller, metallurgists at the Boulder City pilot plant, the publication contains detailed information on the various steps in the production of electrolytic manganese from a 270-long-ton sample of ore from the Cushman, Ark., stockpile, and 250-long-ton samples from each of the other stockpiles at Deming, N. M., and Philipsburg, Mont.

A copy of the publication may be obtained free by writing to the Bureau of Mines, Dept. of the Interior, Washington 25, D. C.

Steel Shortage Hits Water Heater Output

Washington

... Although it turned thumbs down on premium payment plans for production of water heaters for the NHA housing program, the Water Heater and Tank Industry Advisory Committee has advised CPA and NHA that more steel will be necessary to increase production of these items to meet new housing and other needs.

Ironically enough, the committee was asking for more steel at the same time that steel plants were being forced to plan drastically cur-

or low-cost, mass-production heat treating

the trend is to—

MECHANIZED

AJAX SALT BATH FURNACES

Ajax mechanized salt bath furnace installations are daily demonstrating their labor-saving value and production efficiency. For example, when one typical Ajax mechanized unit replaced a manual process—

- FOUR WORKERS REPLACED FORMER 9
- CAPACITY WAS BOOSTED 325%
- REJECTS FELL FROM 10-15% TO 0
- COST-PER-POUND DROPPED TO 1/7 PREVIOUS COST OF TREATING
- 67% WAS SAVED IN FLOOR AREA

Ajax mechanized units take the human element out of timing . . .

assure a constant, predetermined production . . . and produce more uniform results. Various types (some illustrated) are available to automatically convey work of every kind and size through successive steps in such heat treating operations as: Hardening—without scale or decarburization . . . Martempering . . . Austempering . . . Carburizing . . . Brazing . . . Drawing . . . Annealing . . . Solution Heat Treatment . . . Nitriding . . . Descaling and Desanding, etc.

AJAX ELECTRIC COMPANY, INC.

Frankford Ave. at Delaware Ave., Philadelphia 23, Pa.

The World's Largest Manufacturer of Electric Heat Treating Furnaces Exclusively!

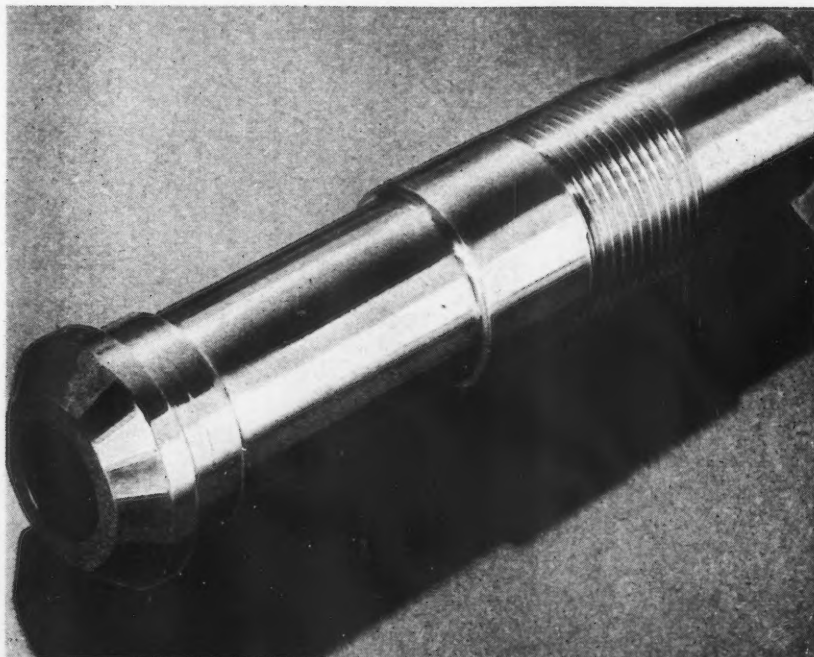
In Canada: Canadian General Electric Co., Ltd., Toronto, Ont.

Associate Companies: Ajax Metal Co • Ajax Electric Furnace Corp. • Ajax Engineering Corp. • Ajax Electrothermic Corp.

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TECHNICAL ARTICLES
ON HEAT TREATING
AVAILABLE WITHOUT COST

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HULTGREN

ELECTRIC SALT BATH FURNACES



Ampco Metal

Extruded Rod gives you

**Production savings of
Extruded stock**

plus

**Performance advantages
of Ampco Metal**

1. Cuts production costs.
2. Reduces waste — sizes parallel requirements.
3. Cuts machining time and saves metal.
4. Smooth surface and compact structure cuts rejections for flaws.

1. Higher fatigue and impact values for longer life.
2. Stronger than other bronze parts for less replacement cost.
3. Higher compressive strength for added durability.
4. Lighter than other bronzes — your equipment weighs less.

You get a double benefit when you use Ampco Metal extruded rod. Production economy and operating stamina make Ampco Metal extruded rod the ideal stock for parts subject to wear, impact, fatigue and corrosion.

Extruded Ampco rods are produced in two grades of Ampco Metal and two grades of Ampcoloy bronze — by the largest extrusion press in the Middle West, and one of the few in the world devoted exclusively to the extrusion of aluminum bronze. Specialization by Ampco has resulted in a finished product whose quality is a production advantage to you and a performance advantage to your customers. Ask your nearby Ampco engineer to help you specify the proper grade for your requirements.



A-32

Write for bulletin 64A.

Ampco Metal, Inc.

Department IA-12 • Milwaukee 4, Wisconsin

Field Offices in Principal Cities

tailed production as a direct result of the coal strike. Steel, said the advisory committee, is the only raw material now preventing capacity heater output.

Total production capacity for 1946 is estimated by CPA at 2.68 million units as against estimated requirements of 2.63 million. Sixty percent of production of specified types must be turned over to the NHA housing program.

Requirements for 1947 are estimated at 2.8 million as against the estimated production capacity of more than 3 million units — provided there should be no interruption to production.

Case School Gets New Electrically Operated Observation Platform

Cleveland

••• A new electrically-operated operated observation platform unit designed for safety and convenience of those who work at various heights above floor levels has been built by the Elwell-Parker Electric Co., Cleveland.

The unit has two platforms, one stationary at a height of 5 ft, the other adapted to be raised or lowered automatically within a range of 8 ft above the floor, providing for observation at 13 ft and adjustments at 15 ft.

Built mainly of aluminum alloy and mounted on ball bearing, rubber-tired wheels, it is easily moved by one man in places where material or equipment and worker must be elevated and where security is essential.

The new unit was installed recently in the Warner & Swasey Observatory of Case School of Applied Science, Cleveland. Collaborating in its development were Dr. J. J. Nassau, professor of astronomy and director of the observatory; S. K. Towson, president of Elwell-Parker, and company engineers.

Capacity of the elevating platform is 500 lb. Type 61-S-T aluminum alloy, heat treated, is used for all structural members, reinforced, riveted and welded into a rigid assembly. Steps and platforms are covered with nonslip rubber treads over plywood attached to metal. The operator may use either the steps to ascend to the stationary platform, or the high-lift adjustable platform.

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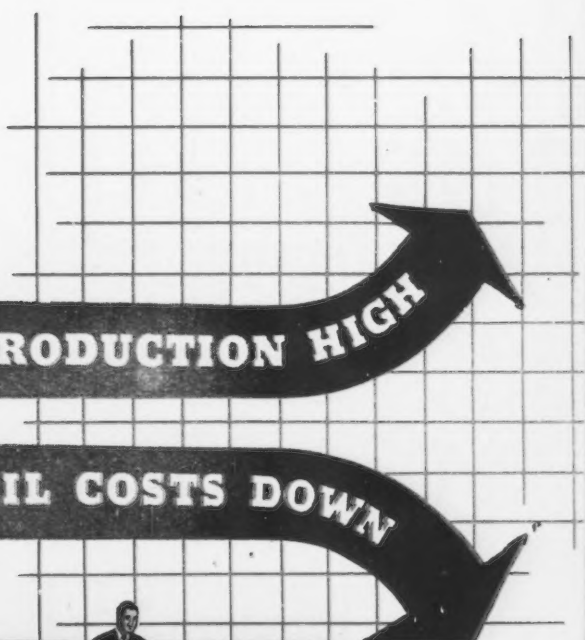
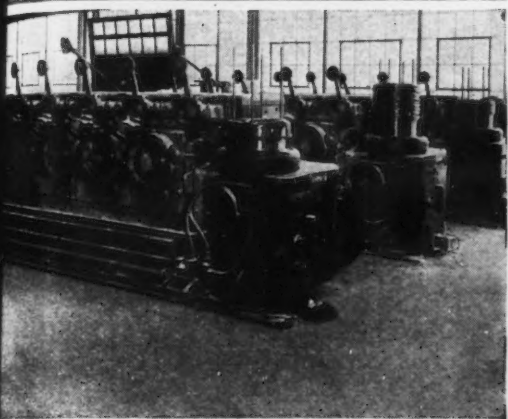
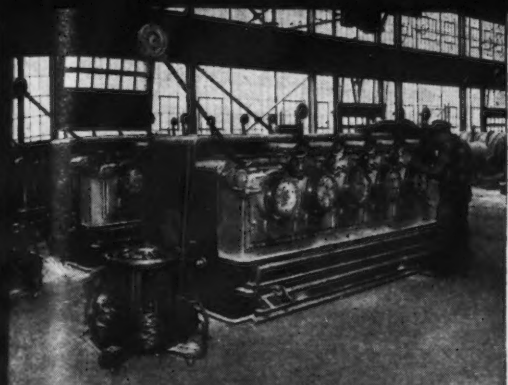
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Vaughn

COLD DRAWING MACHINERY

First and foremost in your calculations of products, markets and profits is the constant factor of top machine productivity — when your cold drawing equipment bears the VAUGHN nameplate! This definable performance is achieved with maximum operating economy, by superior design engineering throughout the complete Vaughn line. Let us relate these facts to your manufacturing program !



THE VAUGHN MACHINERY COMPANY
CUYAHOGA FALLS, OHIO, U. S. A.

COMPLETE COLD DRAWING EQUIPMENT . . . Continuous or Single Hole
for the Largest Bars and Tubes . . . for the Smallest Wire . . .
Ferrous, Non-Ferrous Materials or their Alloys.

Giving Loads the "Brush-Off"

with a

**TOWMOTOR
UNLOADER**



Here's mechanical handling, from a fork lift truck, that completely eliminates manual unloading of stable loads. The Towmotor Unloader saves time and labor by unloading an entire load with a single, sweeping motion.

Newest of the Towmotor Accessory Group, the Unloader cuts carloading time 50%, permits placing of loads anywhere, with or without pallet. Does not interfere with normal lift truck operation. Screen height and length of unloading stroke furnished as required. Installed at the factory, the Unloader is available for use with most new Towmotor models. Towmotor Corporation, 1230 East 152nd Street, Cleveland 10, Ohio.

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and TRACTORS**

RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

NEWS OF INDUSTRY

Says Price Decontrols Will Save \$790 Million From Subsidy Program

Washington

• • • Lifting of price controls will save more than three-fourths, or about \$790 million, of the \$1 billion authorized for subsidies under the Price Control Extension Act of 1946, according to an estimate made by Reconversion Director John R. Steelman.

Subsidy payments under the Act so far amount to around \$138 million, Mr. Steelman said, and subsidies which are to be continued regardless of price decontrol (copper, lead, zinc, stripper wells and certain agricultural products) may require as much as an additional \$72 million for the remainder of the current fiscal year.

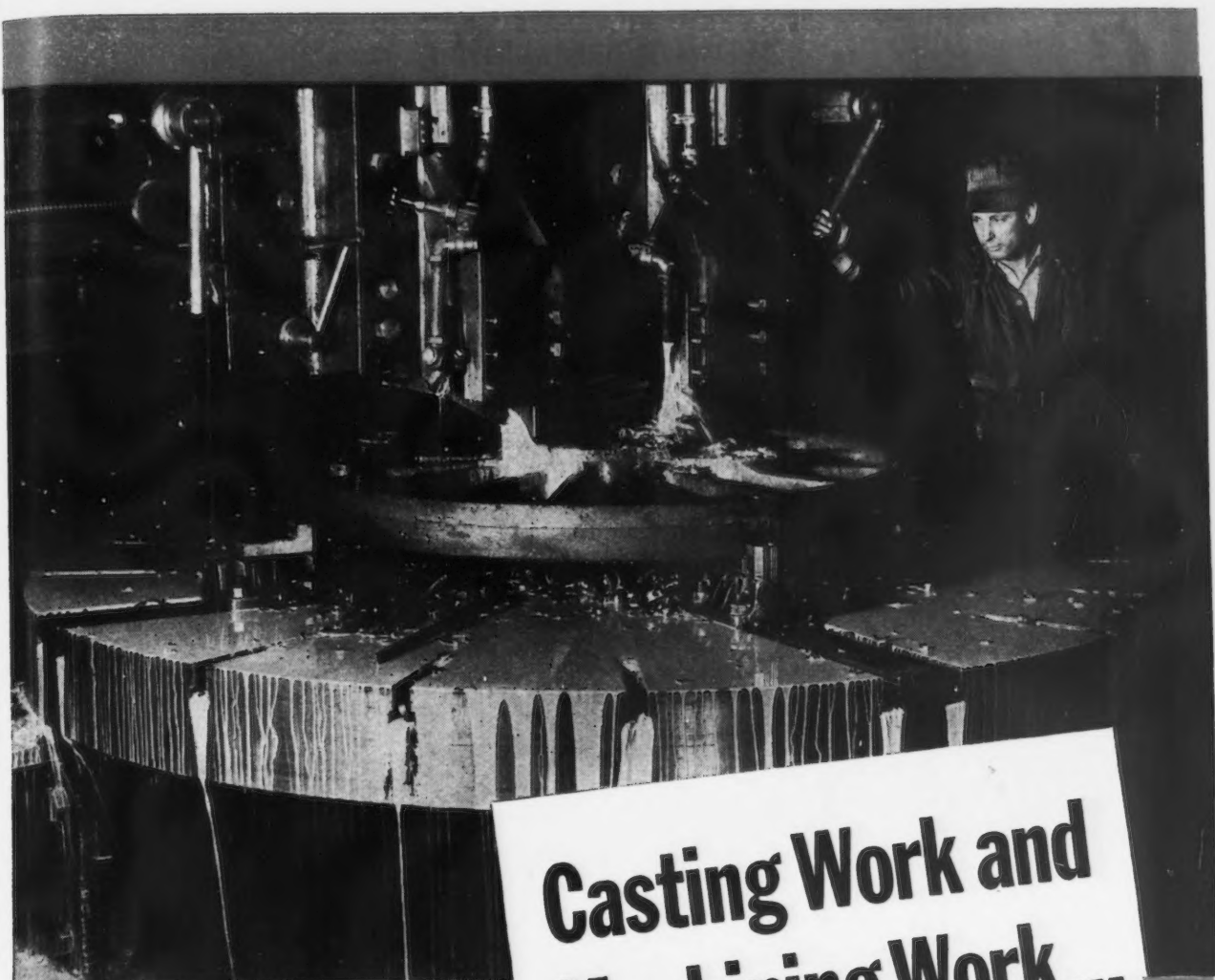
These figures, it is emphasized, refer only to subsidy operations undertaken by the RFC and the Commodity Credit Corp., and do not include premium payments by the National Housing Agency which are authorized and operated independently of the Price Control Act.

Mr. Steelman said the RFC has reported that its estimated subsidies and anticipated losses (purchase and sales) for the period from July 1 through Nov. 9, 1946, were \$119 million. The Dept. of Agriculture estimated its subsidy payments and obligations for the same period at approximately \$18.3 million.

In addition to the payments already made, it was estimated that for the remainder of the fiscal year premiums amounting to \$35 million would be necessary for copper, lead and zinc production. Removal of price controls does not affect subsidies on these basic metals since market prices rather than ceilings will be used in calculating payable premiums.

However, present "A," "B," and "C" as well as the "special" copper premium ranges are being converted to terms of cents per pound to simplify matters. In the case of the Tri-State District concentrates, the premium will be expressed in terms of dollars per ton of concentrates.

Estimates for the stripper well



Casting Work and Machining Work... *Both the Finest*

That machining job on a locomotive driving wheel center, illustrated above, only gives you a single-unit glimpse of PSF's highly complete and modern finishing facilities—but depend upon it, they're unexcelled for any and all steel casting work from a few pounds to a hundred tons. We're equipped to handle any jobs within that range, in carbon or alloy steel, and in practically any shape or degree of intricacy. • Let us work with you.

Complete Facilities for CONTRACT MANUFACTURING to Your "Specs"

We'll make the castings and build your machine, too—sub-assemblies or complete units, to your exact requirements. Call PSF in on your production program.

PITTSBURGH STEEL FOUNDRY CORP. Glassport, Pa.



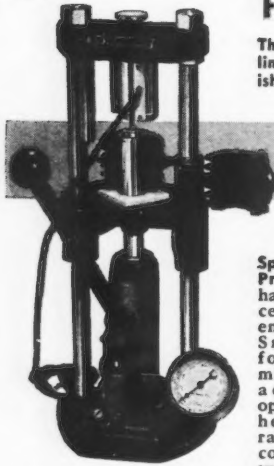
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Glassport, Pa. and McKeesport, Pa.
Sales Offices:
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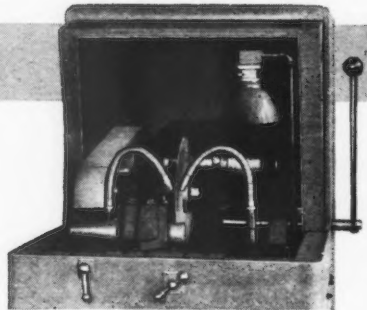
Buehler

SPECIMEN PREPARATION EQUIPMENT AND SUPPLIES FOR THE METALLURGICAL LABORATORY

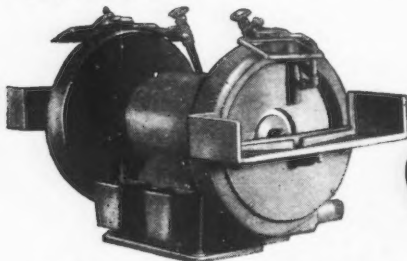
The items illustrated are selected from the complete Buehler line of equipment, tools and accessories for molding and finishing specimen mounts.



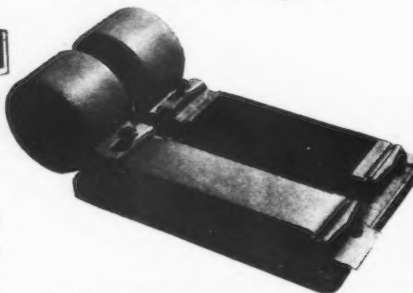
Specimen Mount Press No. 1315 has complete accessibility, no enclosed parts. Smooth performance permits speed and accuracy in operation. Solid heater can be raised and the cooling blocks swing into position without releasing pressure on the mold. This rapid cooling permits production of transoptic mounts in a few minutes. Shipping weight, 100 lbs.



Abrasive Cut-off Machine, Model No. 1000, is a solidly built, heavy duty piece of equipment free from sideplay or vibration with capacity for cutting specimen sections up to 3-1/2". Cutting is done on the front of the wheel and is controlled by a convenient outside lever. The driving motor is a totally enclosed ball bearing, 3 hp. with a separate motor driving the self-contained cooling system. Overall dimensions of cabinet 31" x 47" x 64". Shipping weight, 1400 lbs.



Wet Power Grinder No. 1210, powered with a 3/4 hp. totally enclosed ball bearing motor has two 12" water cooled wheels fitted with closed-in guards and non-shatterable shields. Suitable for coarse and medium grinding. Shipping weight, 310 lbs.



Hand Grinder No. 1410 is a most conveniently arranged two stage grinder. The grinding surfaces are 4-1/2" x 12-1/4" each with heavy 7/16" thick plate glass back. A reserve roll of 150 feet of emery paper is contained in drums for quick renewal of grinding surface. Base has gutter drains for surplus liquid in wet grinding operations. Shipping weight, 95 lbs.



Standard Polisher No. 1500. A complete unit with direct mounted 1/4 hp. radial thrust ball bearing motor. The 8" polishing disc is attached to a tapered arbor on the motor shaft by means of a stout sleeve. This sturdy construction and unusually smooth vibrationless operation helps to prevent pitting and amorphous film in polishing. The removable splash ring

forms a convenient hand rest that aids the operator in precision work. A handy control lever on the mounted switch gives selective speeds of 575 and 1150 r.p.m. Shipping weight, 100 lbs.



Low Speed Polisher No. 1505-2, is particularly adapted to final stage polishing and for non-ferrous metal samples. The 8" disc is attached to a countershaft by a tapered sleeve with a long span between bearings, a construction feature that assures smooth operation. The selective speeds of 150 and 250 r.p.m. make this polisher perfectly adapted to the wax lap or lead lap polishing technique. Shipping weight, 105 lbs.

Either the standard or low speed polishers can be furnished in a single unit table model polisher No. 1516. A three unit table model No. 1540 is also available for maximum convenience in three stage polishing.

In the complete line of Buehler accessories and supplies for the metallurgical laboratory are found: Abrasive paper sheets, discs, and rolls in every grade • polishing solutions • polishing cloths • cut-off wheels and molding powders. Buehler service includes everything needed for preparing precision specimens from metallurgical samples, available from one reliable source.

Buehler Ltd.
A PARTNERSHIP

METALLURGICAL APPARATUS
165 West Wacker Drive, Chicago 1, Illinois

NEWS OF INDUSTRY

RFC SUBSIDY PAYMENTS UNDER PRICE CONTROL

(July 1 through Nov. 6)

(In Thousands of Dollars)

Wood Pulp	\$1,700,000
Binder Twine	700,000
Agave Fiber	3,000,000
Meat	50,000,000
Coal (excess transportation costs)	7,000,000
Alcohol	2,000,000
Copper	2,250,000
Lead	1,300,000
Tin	2,400,000
Lead Residue	11,000
Antimony	150,000
Steel Sheet Bars	750,000
Stripper Wells	10,800,000
Premium Price Plan	25,000,000
Rubber (Wartime commitments in South America & Africa) ..	12,000,000

TOTAL \$119,061,000

The above figures represent only estimated RFC subsidy payments under the Price Control Extension Act and do not include either Dept. of Agriculture payments (\$18.3 million) or NHA premium payments for extra production of 16 commodities for the housing program.

program, on its present basis, probably will entail additional expenditure of \$11.7 million for the fiscal year and the Dept. of Agriculture, \$8.6 million.

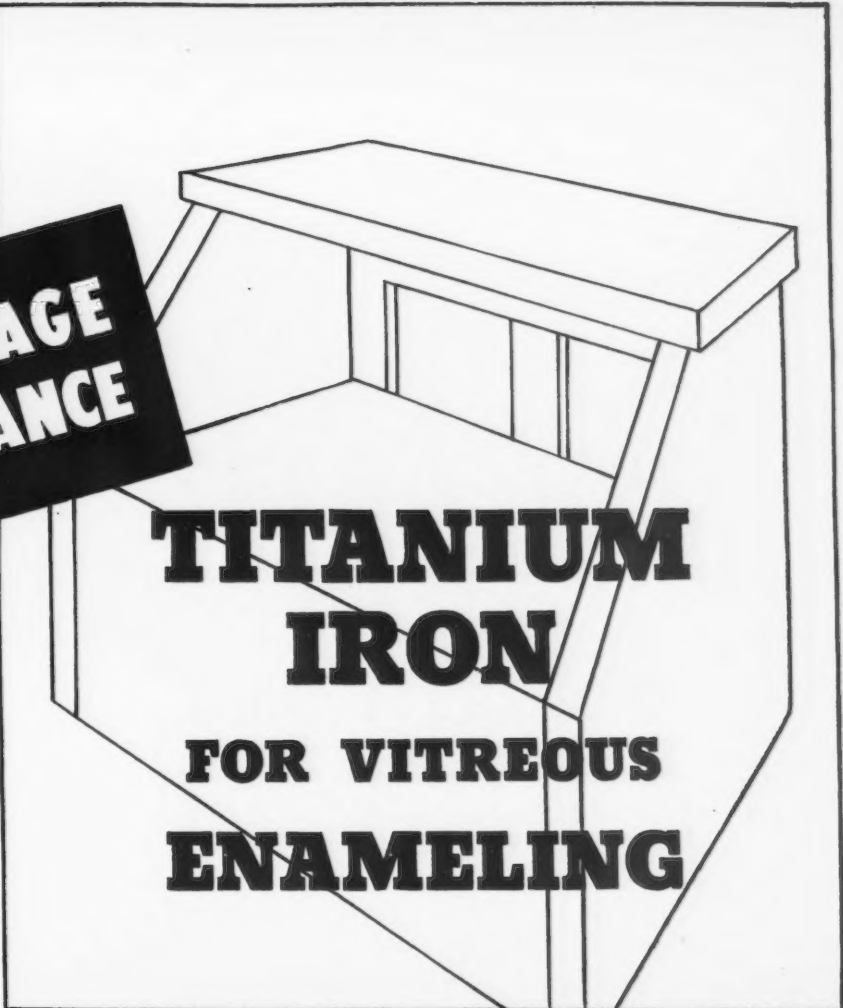
Under subsidy provisions of the Price Control Act, premium payments up to \$100 million were authorized for copper, lead and zinc; \$31 million for Latin American and African rubber, and \$869 million for non-crop programs.

AFA Adds New Members

Cleveland

• • • American Foundrymen's Assn. reports that 23 Clevelanders were recently admitted to membership in its Northeast Ohio chapter. They are: Walter L. Seelbach, president and general manager, William Aston, Stanley Cmunt, Stephen Feiss, Carl Fisher, Alexander Fowler, Charles Geesey, Norris Hange, Edward Hrdlicka, Norbert Jirousek, Charles Orihel, Bernard Stevens, Clayton Stevens, William Stevens, Clem Swencki and Harold Wheeler, all of Superior Foundry, Inc.; R. F. Baley, Ferro Machine & Foundry Co.; A. H. Hinton, Cleveland Sand Foundry, Aluminum Co. of America; Harry C. Huff and J. R. Thompson, Fulton Foundry & Machine Co.; John T. Miller, Fanner Mfg. Co.; J. A. Steels, Ramer Industrial Sales Co., and W. A. Thomas, Bowler Foundry Co.

**THINNER GAGE
SAG RESISTANCE**



**TITANIUM
IRON
FOR VITREOUS
ENAMELING**

ENAMELED WARE of lighter gage stock can be fabricated to desired shapes and retain a better appearance because of the increased sag resistance of Titanium iron for vitreous enameling. This particular feature is clearly demonstrated on chart at right.

Another feature is the elimination of formerly necessary ground coats. For—under proper shop conditions—the cover coat can be applied directly to the base metal. Also, these thin finishes reduce the hazards of chipping and breaking. Furthermore, at enameling heats, there is no sign of enamel boiling. During three years of both research and production experience, no case of fish scaling has been reported.

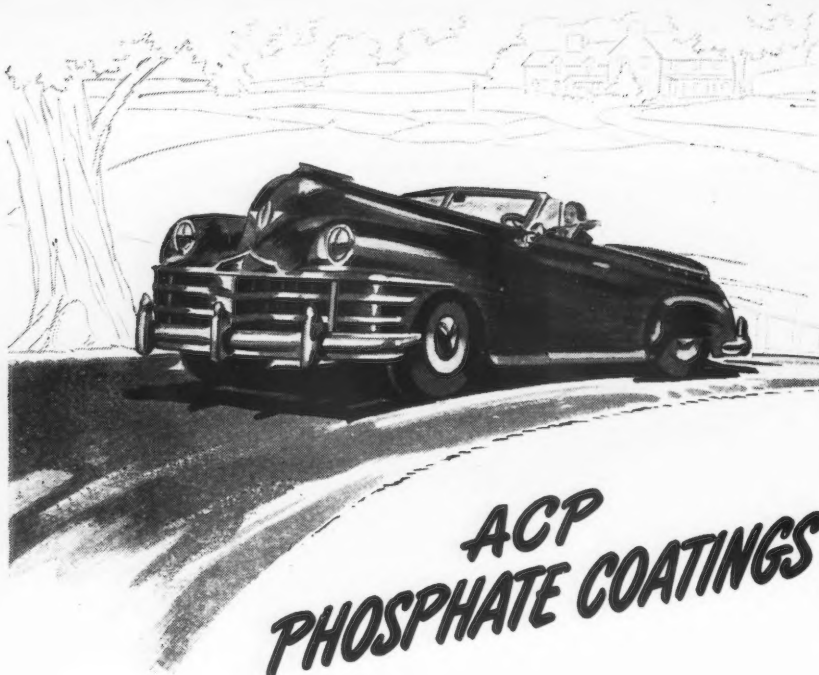
Further information is available upon request.

EFFECT OF GAGE AND COMPOSITION ON SAGGING RESISTANCE	
GAGE AND COMPOSITION	DEGREE OF SAG IN %
24 Ga. Standard Enameling Iron	100
24 Ga. Titanium Steel	57
18 Ga. Standard Enameling Iron	100
18 Ga. Titanium Steel	18

The Titanium Alloy Manufacturing Company produces the titanium alloy used in the manufacture of this steel. For samples of this steel, see your steel supplier. Pending patent applications on the new enameling process and products made thereby are owned jointly by Inland Steel Company, and The Titanium Alloy Manufacturing Company under trust agreement.



TITANIUM ALLOY MANUFACTURING COMPANY
Executive Offices: 111 Broadway, New York City General Offices and Works: Niagara Falls, N. Y.



Positive Protection For Painted Metal Surfaces



ACP phosphate coatings produce an excellent paint-bonding surface on metal parts and provide a foundation for a lustrous and lasting finish. There are various types depending on the kind of metal, its condition and the purpose for which it is to be used as well as the equipment facilities of the manufacturer. Some of these phosphate coatings are briefly described.

Cold SPRAY-GRANODINE in a short spray time forms a uniform, smooth, zinc phosphate coating—a superior base for lustrous, enduring paint finish. Cold Spray-Granodine is of special interest to fabricators of automobile bodies, fenders, refrigerators, cabinets and in general for proper preparation of sheet steel products for *durable, lustrous finishes.*

DURIDINE simultaneously cleans and deposits a thin, tight, close-grained phosphate coating on ferrous surfaces which provide the proper surface preparation for durable paint finish. The Duridine process is simple, economical and effective. Present spray washer installations of mild steel are adequate.

THERMOIL-GRANODINE used in an immersion process creates on steel an oil-absorbing, paint-bonding, crystalline coating of iron and manganese phosphate, integrated with the base metal. Treated surfaces, when oiled or painted, provide excellent protection against rust. Thermoil-Granodine furnishes excellent rust protection for tools, nuts, bolts and unpainted replacement machine parts.

Years of actual experience in the metal cleaning field have enabled ACP to develop chemicals and processes which are giving maximum results in cleaning and surface preparation for paint for varied types of metal and under varying conditions. ACP Technicians have had many years' experience in this field and will gladly consult with you and recommend the ACP products and processes which will most effectively and economically meet your requirements.

AMERICAN CHEMICAL PAINT CO.
AMBLER ACP PENNA.

NEWS OF INDUSTRY

GE President Claims No General Price Increase

New York

• • • Emphasizing that the General Electric Co. is not making a general across the board price increase, Charles E. Wilson, GE president, said recently that each of the company's 200,000 products has been or is being studied separately "in an attempt to restore something like the normal balance between costs and selling prices."

The GE president declared that every price increase "has been made reluctantly and has been as small as we could make it."

Mr. Wilson stressed that the company "has done more than its share to keep down the cost of living." He pointed to the report by the U. S. Bureau of Labor Statistics that all prices which go to make up the cost of living have risen 45.7 pct between 1940 and September of this year, whereas GE prices increased approximately 18 pct. "At the same time," the GE president said, "the average hourly earnings of General Electric employees increased 55.1 pct."

"With the removal of price control, many of the component parts and materials which we purchase from others have been increasing in price," he explained. "We have had to make corresponding corrections in these instances to avoid further losses. However, there is no indication at this time that the process is one of runaway inflation."

Says Britain Expects Little Steel From U.S.

Glasgow

• • • Sir John Craig, chairman of the Colville group of companies which controls 92 pct of Scottish steel production, told a press conference at the Clyde Bridge steelworks that the hope of importing up to 2 million tons of raw and semifinished steel from America this year and next to relieve the British shortage would not be realized. Production in the United States had suffered so much from strikes that Britain could expect very little steel from them before 1948.

Home industries would accord-

ingly be 1 million tons worse off than was expected before the government's recent decision to curtail Britain's exports of finished steel from 1,800,000 tons to 800,000 tons in order to increase the demand of home industry.

Sir John went on to say that his firm's order books were so overloaded that they had now to refuse orders. They had imported a small quantity of steel from Luxemburg and Belgium, but there was a shortage in those countries as there was everywhere else. The firm was working on a few days' coal stocks, and temporary stoppages this winter through shortage of coal might be unavoidable.

Average Monthly Steel Production for 17 Yr Tops 4 Million Tons

New York

• • • Despite the record tonnages of steel made during the war, when production commonly exceeded 7,000,000 tons per month, the steel industry's monthly output of ingots and steel for castings during 17 yr, 1929 to 1945 inclusive, averaged only 4,584,696 tons, according to a recent study made by the American Iron & Steel Institute. That is approximately the amount of steel produced in the month of February 1930. The same tonnage now could be made at only 59 pct of operations under present monthly capacity.

Excluding the abnormally high war years, average monthly peacetime production in the 11 yr 1929-1939, inclusive, was 3,342,760 tons. That would be a month of only 43 pct operations under present monthly capacity, and if continued over a year's time would result in production only slightly higher than the output of 1935.

The 204 months of the full 17 yr cover a diversity of trends. Only one month, August, has the distinction of being neither a year's peak month nor a year's low month of production.

March was the peak month of production in 5 of the 17 yr, while October was the best month in 5 of the years, November in 3, May in 2, July in 1 yr and January in 1 yr.

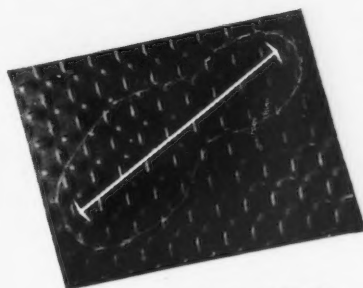
March was the month of poorest production in 1 yr, October in 1 yr, December in 4 of the years, February in 5, and June in 2. In 4 of the 17 yr, July, September, May

SAFE...

and easy on the feet!

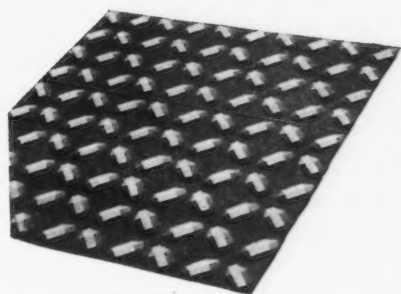
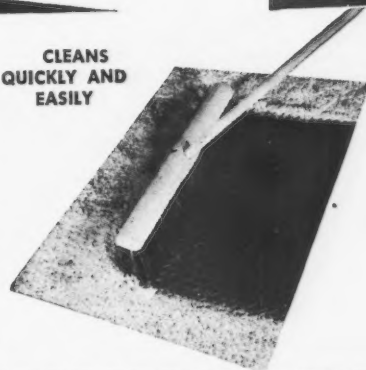
• Prevent slips and falls—reduce fatigue—by installing Multigrip Floor Plate. Men and vehicles start, turn and stop, promptly, safely, on this protective floor plate, be it wet or dry. Install U.S.S. Multigrip Floor Plate for economy too. It makes your floors stronger, makes them last longer.

Inquire at your nearest steel warehouse or write to us direct.



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CLEANS QUICKLY AND EASILY



• EASILY MATCHED



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Tennessee Coal, Iron & Railroad Company, Birmingham, Southern Distributors
United States Steel Export Company, New York

UNITED STATES STEEL

The most important question about Chain:

"WHO MAKES IT?"



There's more to a chain than material, type and size. Equally important are the experience and facilities of the manufacturer who made it. For these affect chain quality. The war greatly increased the quantity of chain produced by American Chain Division. But nothing will ever lower the quality of ACCO Welded Chain, Weldless Chain, or Attachments. We will not compromise with quality. On the contrary, our research department is constantly endeavoring to improve the quality of American Chain, thereby increasing its service to the user.

ACCO



York, Pa., Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Bridgeport, Conn.

**AMERICAN CHAIN DIVISION
AMERICAN CHAIN & CABLE**

In Business for Your Safety

NEWS OF INDUSTRY

and April each were poorest months once.

The low month of the year occurred in the first six months ten times. The high month of the year occurred in the final six months nine times.

Over the full 17 yr the steel industry experienced more months of production averaging 3 to 4 million tons of output than any other range. There were 38 of these months, occurring in 10 yr.

WAA Fixes Prices On Surplus Metal Tools

Washington

• • • Representing about \$16 million in new cost value, WAA has placed its entire inventory of surplus, unused portable power-driven metal working machines and tools on sale at a fixed price basis. The inventory consists of pneumatic and electric tools of standard voltage and cycle.

WAA said the equipment will be made accessible simultaneously to priority holders and the general public on a first-come-first-served arrangement, with fixed prices on the surpluses.

The tools will be sold at established prices "as is," WAA explained, and added that attachments and accessories will be sold with the basic tool and included in the original established price. Used pneumatic and electric tools and unused electric tools of nonstandard voltage and cycle will be offered under a competitive bid method of sale.

Insofar as inventories permit, the tools will be offered in lots of size compatible with commercial sales and awards will be made to the highest acceptable bidder.

Scrap Chapter Elects

Philadelphia

• • • At a meeting held in Philadelphia recently by the Philadelphia chapter of the Institute of Scrap Iron & Steel Inc., John T. Hunt, of M. J. Hunt's Sons, Philadelphia, was elected president. Harry Stave, Stave Brothers, Philadelphia, will be vice-president for the next year, and Dominic J. Giordano, Giordano Iron & Metal Co., Camden, was elected treasurer. Marcus J. Marguies, A. M. Wood & Co. Inc., Philadelphia, continues as secretary of the chapter.

The London Economist

(CONTINUED FROM PAGE 119)

Russians? Is it really possible to believe that they would soften their attitude and advance to meet the West? Is that in character? The answer surely must be No. There are examples of the Soviets yielding to pressure; but it is difficult to remember an example, large or small, of them yielding to kindness. It is far more likely that concessions would be regarded as evidence of weakness, as advantages to be exploited.

And what would be the effect on the Western countries (especially on America) of a concession policy that failed? Would it not be an angry reaction into real hostility? It is, of course, impossible to be sure that the opposite policy of firmness will yield results.

The trouble about this conclusion is that it gives such pleasure to the reactionaries, the neo-Fascists and the ex-Nazis, the clericals and the conservatives, that moderate liberal opinion rebounds in horror from the company that logic and reason bid it keep. This is the explanation of the persistent suggestions that Britain, seeking its usual middle course, should offer to mediate between American and Russian policy. But apart from the usual disadvantages of the dilute compromise, there is one unanswerable objection to any British offer of mediation—neither of the other parties would have it.

Britain is the oldest and still the largest object of Russian diatribes. And any British attempt to mediate would call forth charges of betrayal from America, which might be enough to set off another of the sudden shifts in American policy—perhaps back to the policy of making peace with Russia at British expense with which Mr. Byrnes was toying before last Christmas.

The way in which the liberal-minded man can keep his hands clean in the firmness camp is by holding steadily before him a clear vision of what the object of the firmness is. It is not to win a diplomatic battle, or to undermine the Soviet system or to establish the ascendancy of one

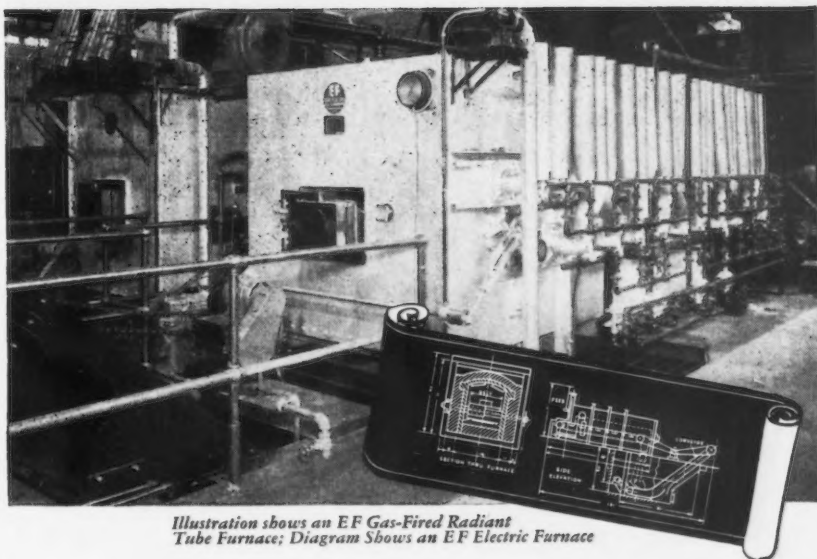
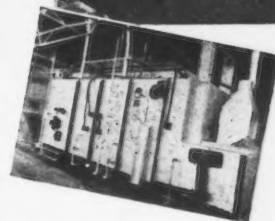
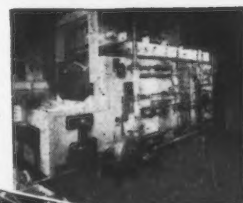


Illustration shows an EF Gas-Fired Radiant Tube Furnace; Diagram Shows an EF Electric Furnace

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NEWS OF INDUSTRY

ideology over another, but to produce a willing agreement.

It is right, after all that has happened, to await some concrete evidence of Russian goodwill before any further advance is made from the West. It is right to insist on deeds and refuse to be taken in by even the most honeyed interviews with journalists. But it will also be right to meet every real Russian step with at least two Western steps towards the common meeting place; that is the magnanimity that the stronger side owes to the weaker. It is right to be unyielding when Russian policy presses upon a real British interest, legitimately held.

But it is wrong to make political demonstrations, condemned to ineffectiveness, in areas where Russia's legitimate interests are greater than our own. If this present contest with Russia is thought of as a diplomatic war, to end with the enemy defeated or driven off, then some day it will be a real war. If it is thought of as the psychological problem of curing the present schizophrenia of the world, then even a drastic treatment—perhaps only a drastic treatment—has a chance of success.

Ruhr Coal Cuts Dim French Steel Hopes For High Production

Paris

• • • Some weeks ago optimism was reported in France concerning the prospect of the French steel industry reaching the 1938 level of production, but some doubt has recently arisen following the announcement of a reduction in coal deliveries from the Ruhr, fears of strikes in the American mines, and shortage of electrical power in France this winter.

For the 2-month period from the beginning of September to the end of October coal allocations to the steel industry were fixed at 1,600,000 tons, that is about 30 pct of 1938 coal consumption. The import program, however, has not been realized. France is now receiving only 29,000 tons per month from Belgium, against 44,000 tons at the beginning of the year, and imports from the Netherlands do

not average more than 11,000 tons per month.

Small amounts are received from the Saar, Czechoslovakia and Poland, but apart from Belgium the only important source of supply is the Ruhr. Deliveries from this source increased from 16,000 tons in June to 57,000 tons in September, but decreased to 44,000 tons in October. France depends almost entirely for coking coal on imports from the Ruhr which reached a maximum of 60,000 tons in July, but fell to 45,000 tons in September and 18,000 tons in October.

In view of the fact that the French steel industry depends essentially on supplies of coke and coking coal from the Ruhr, the announcement of the British plan for Ruhr exports will have a severe effect on French blast furnaces. The only possible solution would be to import American coking coal, but recent developments in the U. S. suggest that there is little or no hope in this direction for some months.

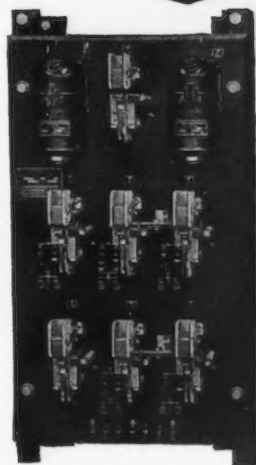
Transport of coal is generally reduced during the winter, and as stocks are insufficient to maintain the present rate of production, decreases in the output of steel during December and January are expected. Much will depend on the success or failure of the British plan in the Ruhr.

French iron and steel output figures for September and October are as follows (in net tons), but the increase in October is expected to be followed by a decrease in November:

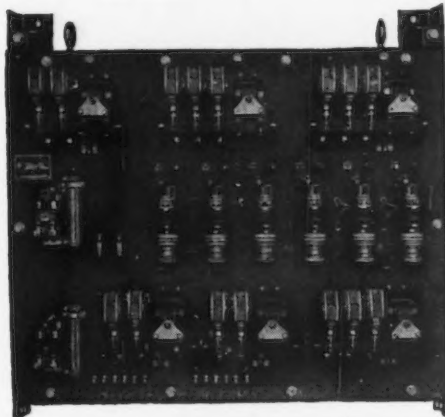
	September	October
Pig iron	382,000	412,000
Steel ingots and castings	464,000	533,000
Consisting of:		
Thomas	249,000	289,000
Martin	174,000	199,000
Electric	41,000	45,000
Rolled products	311,000	369,000

It is reported that French steelworkers have ordered 5000 tons of manganiferous iron ore from Siegerland in Germany. This iron ore, which was developed in Germany during the war to remedy the shortage of manganese, has a content of 46 pct Fe and 9 pct Mn. Imports of manganese ores from North Africa since the beginning of the year total 61,000 tons.

France is to receive 132,000 tons of steel products from Belgium by July 1947, and 33,000 tons have already been delivered.



Form FCR Controller for trolley or bridge motion—for direct current floor-operated cranes.



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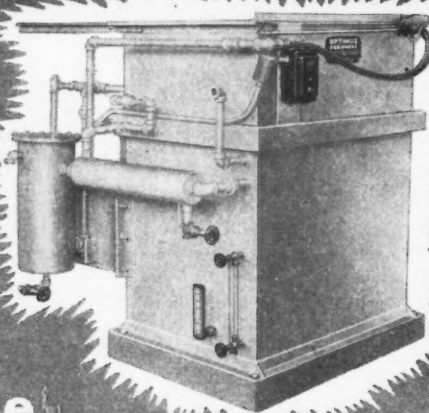
They have all the advantages of the well-known EC&M Control for cab-operated cranes. Contactors are of the heavy-duty, magnetic type. Resistors are carefully proportioned for low-torque hoisting of light loads and for smooth acceleration of bridge or trolley. All motions can be controlled from a single, pendant, master-station with two Push Buttons for each. Individual rope-operated Master Switches are optional.

Send for Bulletins 922 (D.C.) and 931 (A.C.) which illustrate and completely describe these units.

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Gallup Polls

(CONTINUED FROM PAGE 115)

general public is that of featherbedding or make-work. The process whereby employers are required by unions to take on extra workers for a job, whether they are actually needed or not, met with public disapproval during the war when the government reported a critical shortage of manpower in many areas.

Featherbedding is no more popular today than it was then.

Unions contend, of course, that featherbedding is a necessary practice in order to spread available work among men who want jobs. Regardless of the merits of the argument, it is an argument which has not been effectively brought home to the general public by the unions.

Organized labor is fully conscious of its enormous economic power and its substantial political power. The unions can and do throw their weight around effectively.

But the fact remains that the union movement is a minority movement.

Of more than 57 million gainfully employed workers in the United States at the present time, certainly not much more than 15 million belong to unions. Union members constitute less than one third of the gainfully employed.

History shows that few minority groups, however powerful, have been able to ignore their public relations without suffering some retribution.

Yet it should be emphasized again and again that the country is not anti-union in its sentiments. It is very much in sympathy with many of the wage demands made by the unions. Certainly, too, the public is in sympathy with union attempts to improve working conditions. No one would want to see the coal miners go back to unhealthy working conditions that prevailed in many mines two decades ago, or want to see the children of miners have to eat garbage as they reputedly did in the early 1920s when coal was a sick and virtually bankrupt industry.

Today, however, the issue is larger than the specific welfare of one group of workers. It is a question of whether government has sovereign right to control and regulate the power of unions, or

whether unions are organizations that can operate largely outside and beyond the scope of law.

The American people, judging by scores of polls on many aspects of the situation, do not take kindly to the doctrine that unions are beyond the reach of the law.

Just before the Nov. 5 election the institute conducted a sampling referendum on the issue: "Should the Congress elected in November pass new laws to control labor unions?"

The vote was:

	Pct
Yes	66
No	22
Undecided	12

Both Republican and Democratic voters registered approval of such action—the Democratic voters by a 60 pct majority, the Republican by a 77 pct majority.

... Republican proposals to cut federal income taxes have the support of about half of the voting population. The other half thinks there should be no cut in taxes until some of the national debt has been paid off.

Among people who pay income taxes, however, majority sentiment favors reduction, although the majority is not large.

With Republican leaders talking about a 20 pct reduction in taxes when the new Republican-controlled Congress convenes, the institute has put the issue to the public in a coast to coast poll. A similar poll was taken just before the Congressional elections early this month. The trend of sentiment follows:

"Do you think the new Congress should reduce income taxes in 1947, or should this wait until some of the national debt has been paid off?"

	Today	Before Election
	Pct	Pct
Cut taxes	48	41
Wait	44	49
No opinion	8	10

When the poll results were tabulated to show the vote of those people who are required to pay a federal income tax, the sentiment was found as follows:

Income Taxpayers Only

	Pct
Cut taxes	51
Wait	44
No opinion	5

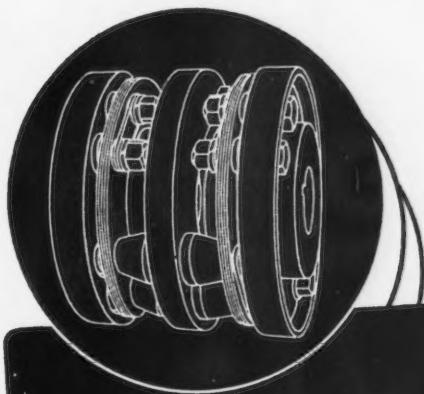
Since nobody enjoys paying taxes, it may come as a surprise

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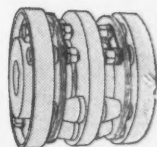


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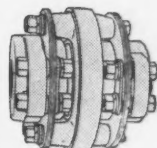
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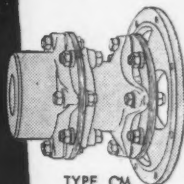
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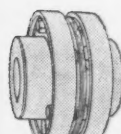
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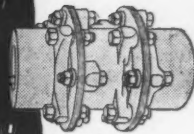
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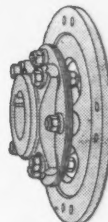
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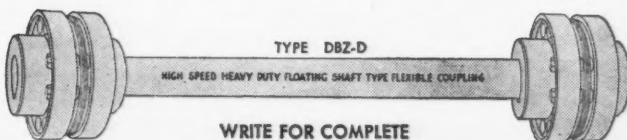
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NEWS OF INDUSTRY

to some observers that as many as 44 pct of the taxpayers are willing to see tax reduction postponed. It is further evidence of the fact, often found in polls during the war, that many Americans are willing to go on paying high taxes and to make sacrifices when they understand clearly the purpose for which they are being asked to sacrifice.

Today's survey found taxpayers who voted Republican in the elections Nov. 5 more anxious to see income tax cuts than Democratic taxpayers.

The vote:

	Income Taxpayers Only	
	Democrats Pct	Republicans Pct
Cut taxes	50	54
Wait	46	42
No opinion	4	4

Although income taxes continue at a rate unheard of before the war, the great majority of taxpayers consider present levies fair and just.

All income taxpayers were asked in the survey:

"Do you regard the income tax you pay this year as fair?"

	Pct
Yes, fair	60
No, unfair	34
No opinion	6

It is significant to note that among the 34 pct who say the tax rates are not fair, there is much more sentiment for cutting taxes than there is among those who feel that the rates are fair.

• • •

The American people want to take part in world affairs. They want to pay their share. But there is strong disagreement on the question of what constitutes a fair share.

A subcommittee of the UN worked out the share of the total UN expenses which the United States should bear. It came out to about 50 pct of the total cost for 1947.

The U. S. delegation stands opposed to paying this much, in spite of the fact that the share was reportedly worked out very carefully on the basis of ability to pay, with the aid of four yardsticks.

The great majority of the American voting public side with the U. S. delegation. They oppose having this country pay such a

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large proportion of the total cost. In measuring sentiment throughout the nation on the issue, the institute had field reporters question a representative sample of the voting population as follows:

"The United States has as much national income as all of the other nations in the UN put together. In view of this, do you think the United States should pay one-half of all costs of the United Nations Organizations?"

The replies:

	Pct
Yes	16
No	69
Undecided	15

Sentiment remains as one-sided on the question among Democratic voters as among Republican voters, among veterans as among the rest of the voting population.

People interviewed in this survey who have had college training are slightly more inclined than other voters to see this country pay half of the total UN bill for next year.

Even here, however, majority sentiment adds up to opposition toward the idea of United States bearing a half of the roughly 23½ millions in the proposed UN 1947 budget.

Here are tables showing the vote among Democrats and Republicans, among veterans, and among different educational groups:

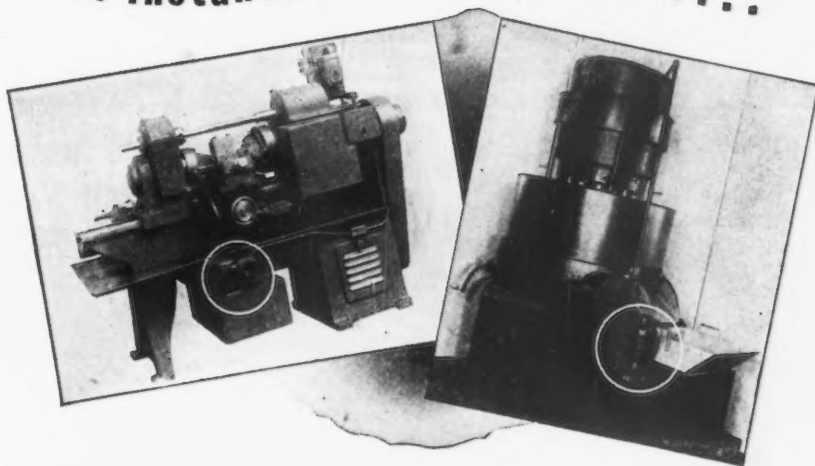
	Yes	No	No
	Pct	Pct	Opinion
Democrats	19	67	14
Republicans	13	74	13
World War II			
Veterans	18	75	7
College	23	71	6
High School	17	71	12
Elementary School or			
Less	14	67	19

Maxon Firm Gets Contract

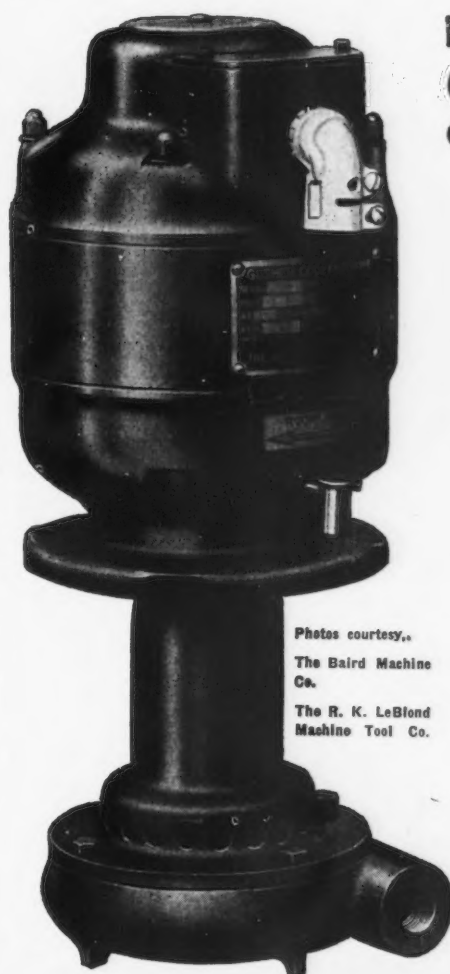
Washington

• • • The Maxon Construction Co., Dayton, Ohio, has been awarded a War Dept. contract for the construction of facilities near Dayton in connection with work performed for the Manhattan project by the Monsanto Chemical Co. The War Dept. said that the cost of construction will be more than \$5 million.

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Photos courtesy,
The Baird Machine Co.
The R. K. LeBlond Machine Tool Co.

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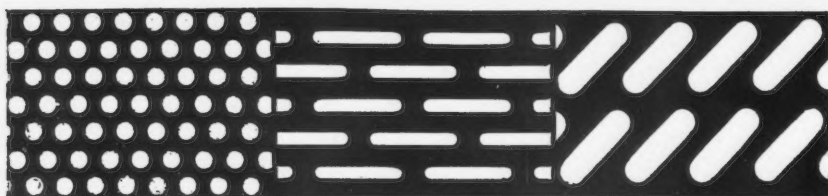
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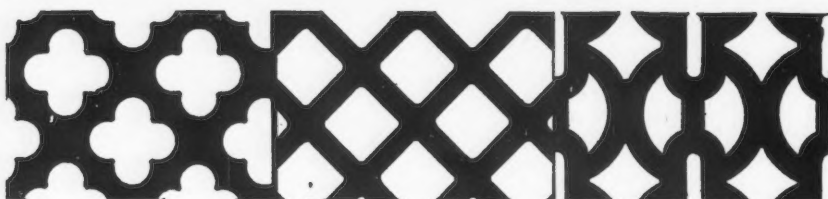
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NEWS OF INDUSTRY

Says British Aluminum Housing Program Is One-Fifth Completed

London

• • • When the 10,000th British aluminum house came off the production lines recently, John Wilmot, Minister of Supply, declared that one-fifth of the program of 54,500 aluminum houses to be completed by the autumn of next year had been achieved. At present 12 completed houses were leaving the factories every working hour, and during the peak production period now being approached it was planned to complete one house every 2½ min.

The houses were constructed in four sections, complete with fittings, such as bath, cupboards and plumbing, and transported to the sites on specially constructed lorries. Recently four sections were delivered to a site at 10 a.m. and before 3 p.m. the same day a family moved in its furniture. Mr. Wilmot said that although the aluminum house is classed as a temporary dwelling, building experts were confident that it would last for 100 yr.

Reporting on the progress that has been made in the production of housing fitments, the minister said that production was steadily increasing and in several instances the prewar level of output had been reached or surpassed. Shortage of foundry workers was still the chief bottleneck in the production of many fitments, and Mr. Wilmot appealed for a further 10,000 men for the light casting foundries and another 10,000 for engineering castings.

British Will Close No Further German Plants Until the Year's End

Berlin

• • • There will not be any further closing of iron and steel plants in the British zone of Germany until the end of this year at least. This official statement contradicts the more optimistic reports that there would be no more closures this winter.

Four iron and steelworks have already been closed. They are: Mannesmann, Grossenbaum; Klockner, Osnabruck; August

Thyssen, Hamborn; and the Dortmund Horder Huttenverein, Dortmund. The Heinrichshutte works at Hattingen were closed under the same order, but has been reopened to work off stocks of cold-rolling steel. It will probably be closed early in the New Year when stocks run out.

These plants were closed primarily through lack of coal and power, but little hope is held out by British officials in Berlin that they will be restarted, as their closing is partly a consolidating measure designed to obviate the inefficient use of fuel.

British officials are now working out a plan for a revised level of industry for the British zone based on the assumption that the economic unity of Germany may not be achieved. This plan is provisional, as there is still some hope that the Russians may cooperate in achieving economic unity or at least in raising the level of industry in Germany on condition that they get some of the increased production as reparations.

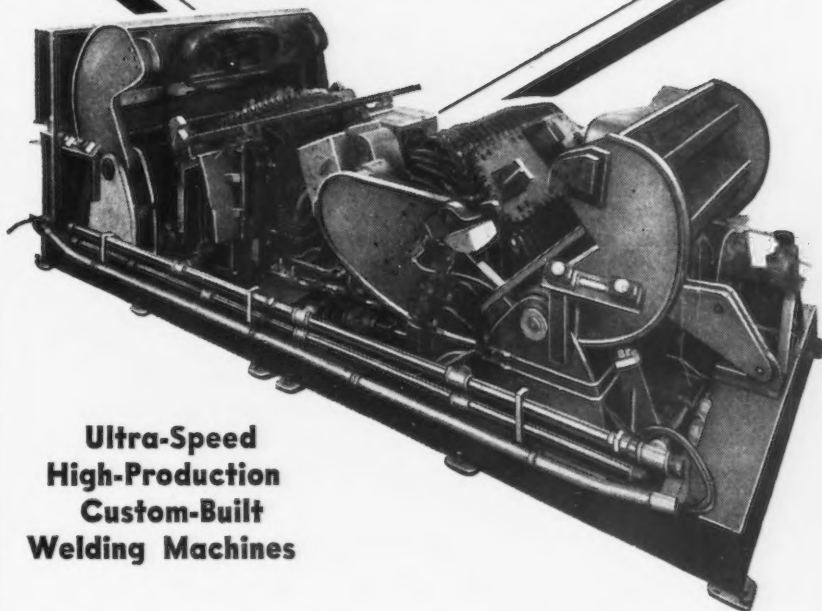
The iron and steel industry in the British zone is to receive 100,000 metric tons more coal in December, which will bring the total allocation for the industry during the month up to 469,000 tons. This increased allocation will come from the 200,000 ton reduction in coal exports of the zone during December. The immediate outlook for the industry is thus rather more optimistic, and it is hoped that this favorable position will continue into the New Year, possibly by further rationing of coal to liberated countries, and more certainly if the present steady increase in coal production, which began with the increase in the miners' food rations, can be maintained.

U.K. October Exports Reach \$363.6 Million

London

• • • United Kingdom exports during October amounted to \$363.6 million, only \$4 million less than the peak month of July which had the same number of working days. The increase over September is \$80.4 million, but this comparison is less satisfactory owing to the reduction caused in that month through holidays. The volume of

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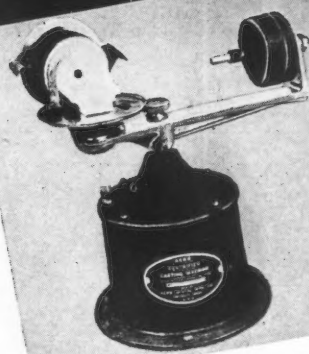
Division of EXPERT DIE AND TOOL CO., INC.

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Phone Twinbrook 1-4327

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EST. 1918

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EXTREME FLEXIBILITY of the No. 4 Universal Cutter and Tool Grinder permits two ways of performing nearly every operation: 1. With the spindle head locked, the sleeve and knee swivel around the column; 2. With the sleeve locked the head swivels on the column.

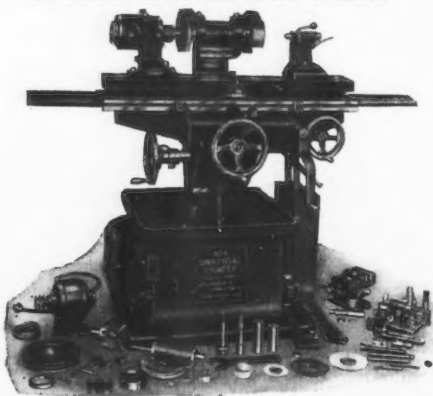
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Write for Bulletin 1045

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Universal Cutter and Tool Grinder



CONVENIENT OPERATION permits control of machine from either front or rear. Both power feed, providing 6 longitudinal table speeds, and equipment for wet grinding are available.



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NEWS OF INDUSTRY

exports in October was 117 pct of the 1938 monthly average; the comparable figure for the third quarter of this year was 104 pct.

The tonnage of iron and steel goods exported in October was 193,000 tons, one quarter below that in July, while exports of machinery, now the largest group, increased by \$4 million to a figure of nearly \$52 million, about one-seventh of the export total. Individual commodities to achieve record exports during October include:

Motor cars	8,141*
Motor car chassis	2,494†
Commercial vehicle chassis.....	2,893*
Bicycles	115,500*
Radios	54,500*

* Highest ever recorded.

† Highest since 1939.

The value of imports in October was \$509.6 million, the highest since the end of the war and 16 pct higher than the average for the third quarter of 1946.

ASME Confers Annual Medals at Meeting

New York

••• The American Society of Mechanical Engineers, holding its 67th annual meeting here, conferred its annual honors and awards. Morris Evans Leeds, 77-yr-old Philadelphia inventor and manufacturer of electrical and temperature measuring instruments, received the society's highest honors, the ASME Medal, for his inventions and his industrial leadership.

Norman Rothwell Gibson, vice-president and director of the Buffalo Niagara Electric Corp. and inventor in the field of hydraulics and hydromechanics, received the Holley Medal.

Honorary memberships were conferred on Dr. Alexander Graham Christie of Johns Hopkins University, Baltimore, and Lewis K. Sillcox, first vice-president of the New York Air Brake Co., Watertown, N. Y.

Air Commodore Frank Whittle, of the Royal Air Force, inventor of the turbo-jet engine, received the Guggenheim Medal for Achievement in Aeronautics. The medal fund is administered by the United Engineering Trustees, Inc. The presentation was made by Theodore P. Wright, a holder of the medal.

Pierce Named President Of Dearborn Motors

Detroit

••• The appointment of Frank R. Pierce, a former vice-president of General Motors, as president of the Dearborn Motors Corp., the newly formed company which will distribute Ford tractors and farm implements, has been announced by Henry Ford II, president of Ford Motor Co.

The new corporation will succeed Harry Ferguson, Inc., as distributor of the Ford tractor and a new line of farm implements to be manufactured according to special engineering designs.

A former sales manager of frigidaire division of General Motors, Mr. Pierce left that company in 1939 to go with Nash-Kelvinator. He returned in 1943 to become manager of the Detroit office of General Motors public relations department and was appointed vice-president in charge of employee cooperation and a member of the GM general staff in July 1944.

Mr. Pierce began farm selling as far back as 1921. He worked for a dairy feed company after World War I and in 1921 joined a Philadelphia distributor of Frigidaire. The following 11 yr he served as salesman, sales supervisor, sales manager, educational director and general sales manager for this firm.

Soviet Action Reported Disastrous in Germany

Berlin

••• It is reported that German economic experts who have examined the effects on German industry of the Soviet action in removing to Russia the Zeiss works and Schott glass works at Jena, and deporting highly skilled workers, have stated that a "disastrous effect" must be expected.

Hospitals and laboratories will be unable to obtain equipment and many branches of industry will have to go short of delicate measuring instruments. The machines left represent between 5 pct and 10 pct of the total, and some are useless without other machines which are being sent to Russia.

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Being the largest exclusive manufacturer of metal sawing machines and blades, both hack saw and band saw type, we have the correct answer to your cut-off problems. Each MARVEL model has a distinct application, so write us and we will send our catalog, price, and recommendation for the saw to fill your requirements most efficiently. MARVEL sawing engineers are also available to discuss and analyze your cut-off work. (Without obligation of course)

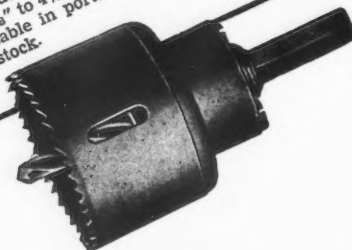
ARMSTRONG-BLUM MFG. CO.

5700 Bloomingdale Ave., Chicago 39, Illinois, U.S.A.

Heavy feed at high speed spells doom to the ordinary hack saw blade; down-time for your machine, extra expense in money, man hours, and production. The MARVEL Hack Saw Blade, because it is positively unbreakable under these conditions, should be "a must" tool in every efficiently operated shop. A tough alloy steel back is electrically welded to high speed steel teeth, producing a blade that can be pulled to almost unlimited tension; can withstand extra heavy feeds and the heat and abrasion of high speed heavy duty sawing.

The same exclusive unbreakable feature of MARVEL Hack Saw Blades is also a feature of MARVEL Hole Saws, giving these saws the ability to stand up under abuse. MARVEL Hole Saws cut holes from $\frac{3}{8}$ " to $4\frac{1}{2}$ " diameter in stock up to $1\frac{1}{8}$ " thick. Usable in portable drill, drill press, or lathe tail stock.

*Heavy feed
at
high speed*



NEWS OF INDUSTRY

Gas Turbine Generator

(CONTINUED FROM PAGE 137)

double-armature dc traction-type generator connected to the turbine through a single reduction gear. Tests to date indicate smooth mechanical performance.

The possible applications of such a simple open cycle gas turbine are numerous. As a locomotive prime mover it can be built in large powers within a single cab and would require no cooling water. Four of the present units could be installed in a standard cab, the company declared.

For marine auxiliary applications it may find a place as a standby power unit and as power booster, and with regenerators and inter-coolers added to raise thermal efficiency it may serve as the main drive. For large ships, however, the closed cycle may be adopted to reduce weight and space.

Other applications such as portable power plants in the gas fields, power units for gas transmission lines, and power plants for factories where circumstances make it advantageous are all possibilities.

In operation air is taken in by the compressor through the inlet metering nozzle and silencer and compressed to pressures of 30 to 75 psi absolute, depending on the load carried. Fuel oil is mixed with the compressed air and burned in the combustors, the amount of fuel burned being controlled to limit the temperature of the gases to between 700° F and 1350° F at the combustion chamber outlets. The hot gases are expanded through the power-producing turbine and the resultant exhaust gases pass through a diffuser, elbow, and silencer to the atmosphere.

The turbine develops approximately 6000 hp, of which 4000 hp is used to drive the compressor. The remaining 2000 hp is the useful output delivered to the dc generator. The full load speed of the turbine and compressor is 9200 rpm while the generator speed is 1200 rpm.

The complete assembly measures 26 ft long, $3\frac{1}{2}$ ft wide and 6 ft high. The total weight of 38,000 lb



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Postwar demands are necessitating fast production schedules which are being met with the aid of Euclid Cranes and Hoists everywhere.



You will find in the Euclid Line a unit or units to meet your specific requirements.

THE EUCLID CRANE & HOIST CO.

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WRITE FOR CRANE CATALOG

is divided approximately one-third to the turbine, compressor, combustors, and gear; one-third to the bedplate and accessories; and one-third to the dc generator.

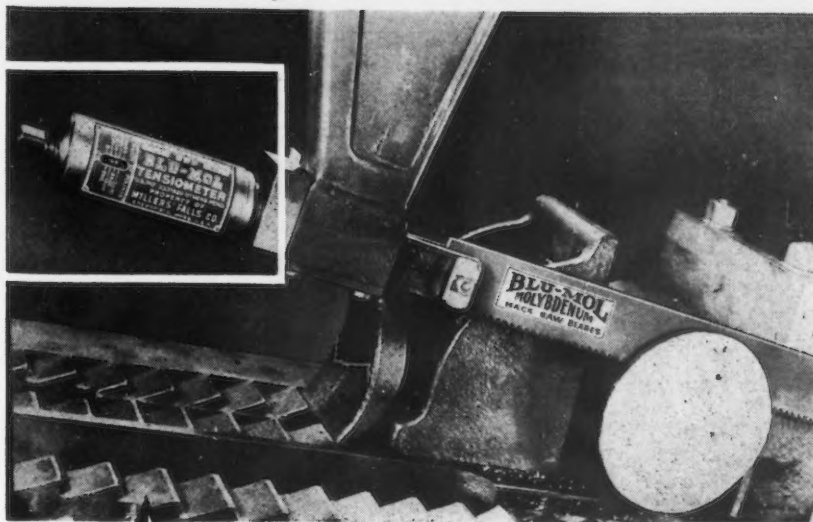
The compressor is of the axial flow type, designed to pass 25,000 cfm of air at a pressure ratio of 5 to 1. It has a maximum speed of 9200 rpm and the pressure ratio is varied from 2:1 to 5:1, depending on the load carried, by changing the speed.

The gas turbine itself consists of eight stages designed for equal heat drop over the stationary and rotating blades at the mean diameter. Blading is made of cobalt-chromium-tungsten alloy by the precision casting method. The rotating blade is tapered and twisted and has a serrated root machine in the base. This machining is accomplished with a form type grinder which in turn is dressed with a crusher wheel. The stationary blades are also tapered and twisted and have a single "T" type fastening which is machined by using a carbide tool. All of the blading is unshrouded and profiled at the tip.

The rotor is machined from a solid forging of stabilized 19-9 stainless steel, the main section being 14½ inches in diameter and 24 inches long. This was the largest forging ever made of this material at the time and a number were rejected before a sound forging was secured.

The cylinder is made of stabilized 19-9 stainless steel into which are cut grooves for holding the stationary blading. The design was made as nearly symmetrical as possible. The horizontal flanges have been eliminated and the vertical flanges on the inlet end have been slotted to minimize the effect of thermal distortion on the cylinder walls due to rapid temperature change.

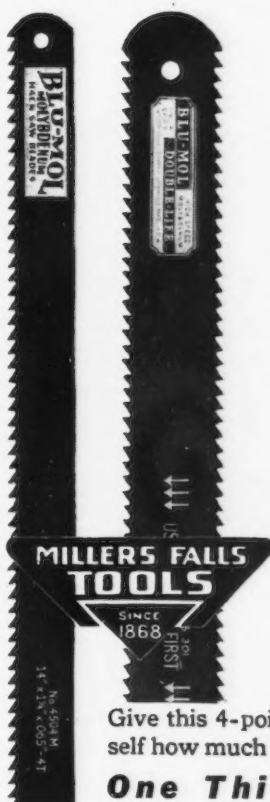
While the testing of this unit is not yet completed, it appears that it will satisfactorily meet its expected performance. Starting tests have been completed which have shown that with 80-kw cranking power the unit can be brought from standstill to operating speed in one minute. If 50 kw is used the time is increased to approximately 1½ min.



THIS 4-POINT PROGRAM WILL CUT HACK-SAWING COSTS at no expense to you . . .

Here is a new, revolutionary program that assures maximum life and the most accurate cutting from your power hack-saw blades at no additional cost. It consists of:

1. **The Tensiometer**—a simple, dependable gauge that applies and maintains proper blade tension regardless of blade temperature, eye elongation, or blade stretch. It is shown above.
2. **The Pressiometer**—a gauge which accurately measures the direct downward feed pressure exerted on the blades. Thus it is easy to obtain the correct pressure to insure accurate cutting and reduce blade breakage.
3. **Trained Sales Engineers**—men of exceptional experience in curing hack-saw ills. At absolutely no expense to you, these men will test your machines with the Pressiometer to make sure that they are feeding correctly. They will equip your machines with the Tensiometer to insure longer blade life and more accurate cutting.
4. **Blu-Mol High Speed Molybdenum Blades**, single or double edge—your guarantee of the best cutting results on any metal and under any conditions.



Give this 4-point program a trial in your plant and see for yourself how much money can be saved. Write for further information.

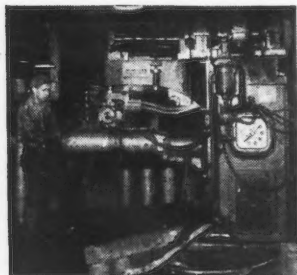
One Thing in Common—QUALITY!

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Silicone News



**DC Silicone Insulation
enables transformers
to take overloads**



Photo, courtesy Everhot Heater Co.

Overloads and moisture caused frequent failure of the air cooled, 150 k.v.a. transformer in this welding machine used by Everhot Heater Company of Detroit. Welding 38 to 60 inch lengths of 10, 11, 12 and 13 gauge steel at a rate of 23 to 33 inches per minute in a machine having a throat of only 30 inches created more heat than conventional organic insulation could stand. Add to that the presence of moisture common to such welding operations, and you have service conditions far too severe for conventional insulation, but well within the range of DC Silicone Insulation.

The only alternatives to frequent failure under such difficult service conditions are new equipment designed for heavier duty or Silicone Insulation. Everhot Heater Company chose to have the coils of their welding machine rewound with Silicone Insulation by National Electric Welding Machine Co. That choice has resulted in a very considerable saving.

Rewinding present equipment with DC Silicone Insulation gives it greater heat and moisture resistance than it had to begin with. That means more reliable operation and longer service and it saves capital investment. It's worth finding out about.

Instructions on how to apply DC 996, the Silicone insulating varnish for electric machinery are given in pamphlet No. S 3-3.

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NEWS OF INDUSTRY

Atomic Power Development

(CONTINUED FROM PAGE 137)

on are: The actual size and shape of the fuel unit, the method of transferring heat from the pile to the heat engine or the prime mover, the problem of loading and unloading the pile, the problem of automatic control of the pile and its accessory equipment, including steam turbine and generator and the problem of shielding the whole unit for protection against radiation.

"This pilot plant for nuclear power will be pushed to completion as rapidly as possible," said Dr. James H. Lum, director of Clinton Laboratories. "Numerous experiments must be made before final design can be settled. These experiments may well consume all of 1946 and part of 1947. The difficulties of procurement of equipment of this special category may also delay until 1948 the starting of the final pilot plant."

Considerable emphasis will be laid, during design and construction of the plant upon achieving a heat source of long life and great reliability. These attributes are of particular importance because of the radio activity which renders any pile, once operating, difficult and dangerous to shut down for maintenance. The radio activity requires heavy shielding of the pile.

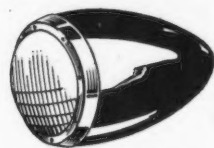
The pile's first operation will be to provide heat energy for steam electric generation, operating at conventional central station temperature levels ranging from 650° F to 940° F.

No indication may be had as yet of the capacity of the pilot plant. It is possible that all equipment will be relatively conventional from the boiler through the generator. None of the major components has yet been ordered and their production would require months under normal circumstances.

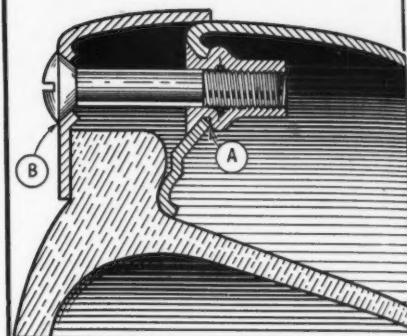
The Monsanto Chemical Co. accepted the assignment for the experimental project at the specific request of the Manhattan Project. In an effort to obtain the best talent and to give industrial concerns an opportunity to participate in the experiment, invitations to various companies and groups were issued by Monsanto as prime government contractor. Engineers and scientists from the companies

FASTENING PROBLEM:

Secure rim of sealed beam headlight with a screw attachment in threaded base. Provide strong anchor for screw. Installation must be quick, easy.



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RIVNUTS
solved it...



AFTER METAL was drilled and dimpled, an aluminum Rivnut was placed in hole "A" and upset with easy-to-operate header tool. No backing required! Attachment screw was placed through hole "B", then screwed into clean threads of Rivnut core. A strong foothold for the screw was provided—rim was firmly in place and man-hours on the job saved. Perhaps Rivnuts can solve your fastening problem. Why not check up today?

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invited have been given leaves of absence from their firms, and assigned to the power project.

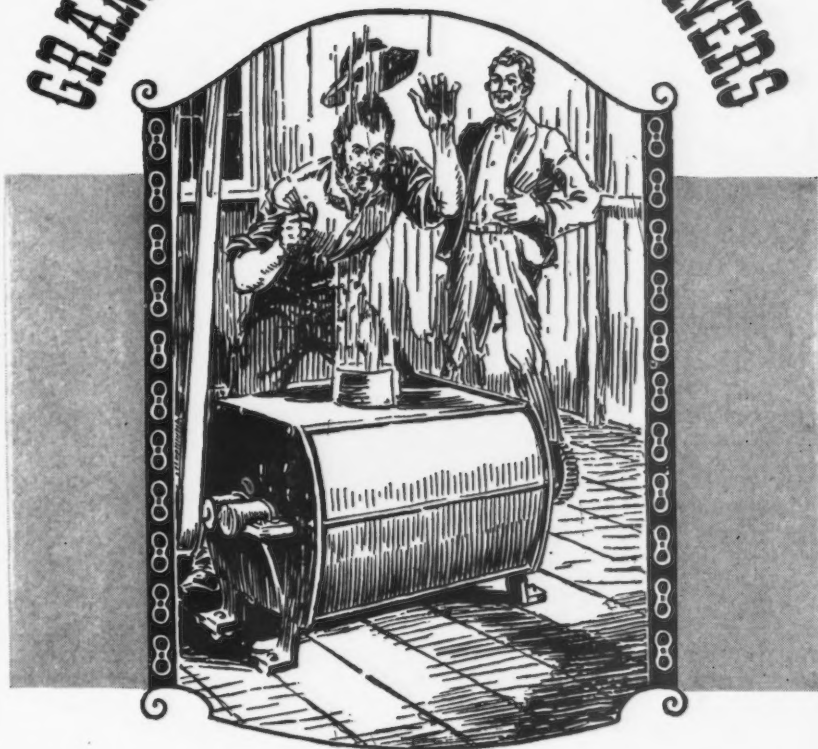
Representative groups affording working members to the power plant are: Allis-Chalmers Co., Milwaukee; Babcock & Wilcox Co., New York; Bureau of Ships, U. S. Navy, Washington; Frederick Flader, Inc., Tonawanda, N. Y.; General Electric Co., Schenectady, National Advisory Committee of Aeronautics, Washington; Northrop Aircraft Corp., Hawthorne, Calif.; Tennessee Valley Authority, Knoxville, Tenn.; Purdue University, Lafayette, Ind.; Wright Aeronautical Corp., Woodbridge, N. J.; University of Wisconsin, Madison, Wis.; University of Chicago, Chicago.

Individuals and industrial companies who are performing consultant service with the Power Pile Division are: F. H. Colvin, Point Pleasant, N. J.; Dr. Farrington Daniels, University of Wisconsin; Combustion Engineering Co., New York; Commonwealth Edison Co., New York; Foster Wheeler Corp., New York; Frederick Flader, Inc., Tonawanda, N. Y.; General Electric Co., Schenectady; J. E. Willard, University of Wisconsin; J. I. Yellot, research director of the Locomotive Development Committee (a research group sponsored by several railroads and coal companies), Baltimore; National Carbon Co., Atlanta.

The problems will include turbines, blowers, condensers, heat transfer units and generators, and some of the companies participating are experts in these fields. The services of these experts will be utilized to the fullest extent. Basically, the present program is confined to a study of the overall problem with each group joining in the various studies.

In a consideration of the generation of electric power from atomic energy it is important to realize that atomic or nuclear energy does not involve entirely new methods of power generation as did the steam engine; it is simply a new fuel and can be used only within the framework of present day power generating systems. Although there is a remote possibility that in the future some of the energy available within the atom may be released directly through a medium other than a heat engine, such a device is not

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"That's a better blower than the fan on my foundry cupola."

The double impeller principle in Rotary Positive Blowers came from this water motor with its wooden impellers in an iron case, devised by the Roots brothers in 1854. It led to the establishment of one of our predecessor companies.

Since then, we have built 250,000 blowers, meters, exhausters, vacuum pumps and similar equipment, whose successful performance has been demonstrated in practically every industry.

For many years, we built only Rotary Positive units. Then, as new products and processes showed a growing need for Centrifugal equipment, we expanded our activities. Today, R-C *dual-ability* to supply either type gives users the advantages of unprejudiced engineering.

So, whatever your need may be for moving or measuring air or gas, and for many liquid applications, you can depend upon R-C *dual-ability* for long-time, profitable performance.

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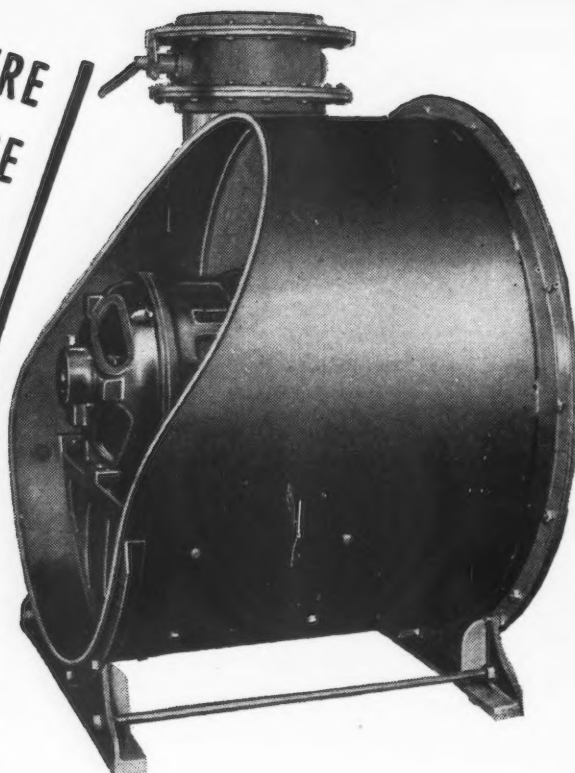


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KNOWLEDGE
IS AIR
POWER

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In addition to bulletins on each of the standard types of Spencer Turbos, we offer the Spencer Turbo Data Book which gives tables, formulas, electrical specifications and a description of many varied applications.

Keep your present Spencers well greased for the duration but plan for new postwar applications now.

THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

TURBO-COMPRESSORS

168—THE IRON AGE, December 12, 1946

NEWS OF INDUSTRY

at present known. The current work is concentrated on the problem of adapting present power producing techniques and equipment to this new type of fuel.

As matters stand, no element of a power plant can be omitted when nuclear energy is used to replace our present forms of fuel, although fuel handling equipment will be greatly reduced in size and may be omitted entirely in plants designed to operate for a limited time.

A great deal which has been written since Aug. 6, 1945, has created the general impression that the solution to the problem of power generation from nuclear energy was achieved when the bomb was successfully tested. This has no basis in fact. A bomb and a power pile are two vastly different problems.

The bomb was a "one-shot" device. The object in bomb development was an explosion, and the consequent destruction of the bomb. A stationary power pile, on the other hand, must be designed to last for many years. It must be capable of starting and stopping quickly, and of being controlled continuously with precision, over a wide range. Furthermore, its design must incorporate features to prevent irradiation of personnel.

The designer of an atomic power pile has practically no data to guide him, so new is the field. He must feel his way without certainty of the correctness of his design until actual tests of the completed structure are conducted.

The difficulties confronted in designing and constructing an atomic power plant can be broken down into four broad fields: (1) Materials of construction; (2) heat transfer medium; (3) auxiliary and operating equipment; and (4) safety.

Concerning the first category—materials of construction—materials must be found which not only meet the requirements of present power production facilities—that is, possess strength, resistance to deformation and ability to withstand high temperature—but also have the additional quality of not breaking down under neutron bombardment. The metals used in a power pile must be capable of withstanding very high operating temperatures and considerable research and testing

will be required to develop suitable metals.

A suitable moderator to slow the neutrons down to the desirable speed must be employed in some pile designs. Again, besides possessing the required neutron and moderating qualities, this material must be capable of operating continuously at high temperatures.

The second major field of difficulty which requires much research and investigation is the choice of a suitable heat transfer medium or pile coolant. The purpose of the coolant is to remove the heat generated by fission within the power pile and convey this heat energy to the power system. Theoretically, it is possible to use ordinary water, heavy water, gases, or liquids other than water. Several liquid metals are being studied, but little is known of their properties from a nuclear and corrosive standpoint.

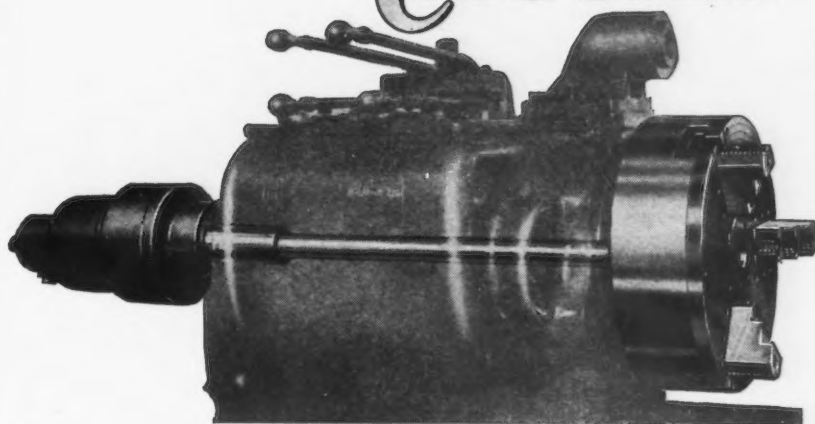
The third broad field is the design and development of auxiliary and operating equipment such as pumps, blowers, valves and heat exchangers. Since these may become radioactive during operation of the pile, they must be so designated as to be trouble free and must require either no maintenance for extended periods of time, or maintenance by remote control apparatus which entails obvious difficulties. Further, because of the danger to the personnel, the pumps, blowers and valves must remain absolutely tight and prevent any leakage.

The protection of pile operators from radiation and radio activity and other fission products is the fourth broad field of difficulty confronting the designer of an atomic power plant. The radio activity emanating from a power pile is the equivalent of tons of radium. Much of this radio activity persists even after the pile is shut down. For protection against the radiation it is necessary to use materials that are effective in slowing down or stopping neutrons and in absorbing gamma rays. At Hanford, where plutonium production piles are located, massive shields are necessary.

Thick shields are required even for piles producing a relatively small amount of power. At the present time this is a major difficulty retarding the development

save time, save manpower
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UNION
POWER
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INCREASED pressure for heavy cuts — minimum pressure for light cuts — at the operator's fingertips. Union power operated chucks give you speed of operation, greater range of chuck jaw pressures at reduced operating cost, man time, down-time and operator fatigue.

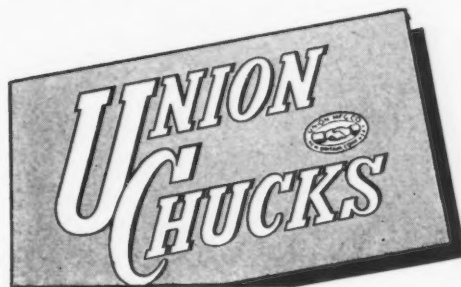
UNION Electrically Operated Chucks have been giving effortless and trouble-free service for over 12 years. Pieces are securely held with power cut off. Power requirements are negligible. Fully adjustable jaw pressure available in any jaw position.

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Whatever your requirements, a complete engineering service and the broadest line of chucks in the world are available from UNION. Write for Catalog No. 61 for full details.



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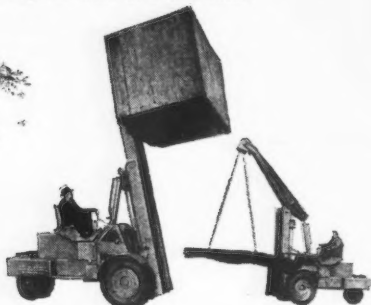
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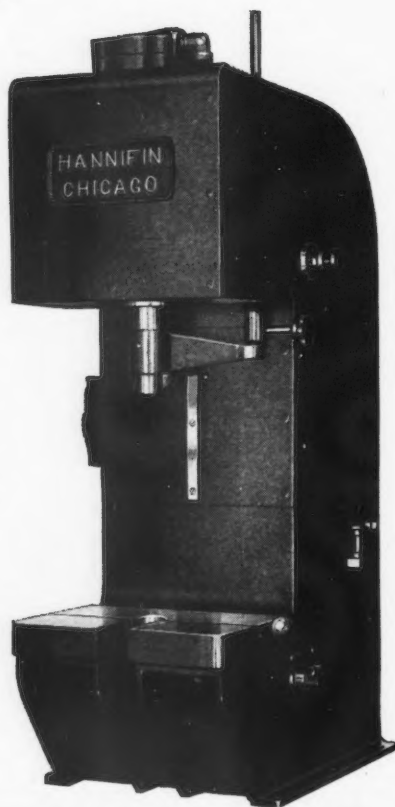
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NEWS OF INDUSTRY

of small atomic power plants or nuclear reactors.

Besides these four broad fields of investigation, several long-range considerations must enter into any discussion of the generation of usable power from an atomic pile.

It is important to keep in mind that we do not at this time have sufficient knowledge or experience with nuclear fuels to make any predictions as to the future economic position of nuclear fuels with relation to conventional fuels.

A report on the cost estimates of nuclear power was recently made to the U. S. representative, Bernard M. Baruch, on the United Nations Atomic Energy Commission. The study was made by members of the staff of Clinton Laboratories at Oak Ridge and the Monsanto Chemical Co. engineering department under the direction of Dr. Charles A. Thomas, vice-president and technical director of Monsanto.

The report follows in part: "While no such plant (nuclear power plant) has ever been built, it is felt probable that a large stationary nuclear power plant could be built. Based on prices now current, a plant designed along the lines indicated and producing 75,000 kw could be built in a normal locality in the eastern United States for approximately \$25,000,000. On the assumption that the plant would operate at 100 pct of capacity and that interest charges on the investment would be 3 pct, the operating cost of the plant would be approximately 0.8¢ per kw-hr.

"This is to be compared with coal power plants which would cost \$10,000,000 under the same conditions. The operating cost depends on the price of coal. The price of bituminous coal of 13,500 Btu is about \$3.50 per ton at the mine and about \$7 per ton delivered to the furnaces of a power plant in the eastern United States. The operating cost of such a power plant would be approximately 0.65¢ per kw-hr, again on the assumption that the plant would operate at 100 pct of capacity and that the interest charges on the investment would be 3 pct. Equality of operating costs between coal power plants and nuclear power plants would be reached if the coal cost \$10 per

on. It must be realized that lower costs of nuclear power plants can best be achieved by continued research and development.

"It should be emphasized that these costs imply the successful solution of a number of difficult technological problems.

"In the case of nuclear power, the operating cost is greatly affected by the large investment, which is reflected in the interest, depreciation and maintenance charges. The labor and supervision charges for the nuclear plant are expected to be greater than for the coal plant, until such time as the production of electrical power from nuclear energy has been further developed. It seems reasonable to expect that the future development of nuclear power will result in the standardization of design and construction, and a material reduction in the investment and operating cost.

"The cost of power from coal is primarily determined by the price of coal, which constitutes about 55 pct of the total operating cost. The prices of coal and fuel oil have increased greatly since before the war and show signs of increasing further in the future. The coal plant figures are based on high quality coal as delivered to plants in the eastern part of the United States during the second half of 1946. It would appear that the cost of nuclear power may decrease and the cost of coal power may increase as time goes by, and that the development of nuclear power may prove to be attractive to those industries which are capable of undertaking the development.

"Nuclear power plants would make feasible a greater decentralization of industry, a desirable factor in the world economy. Only a trivial amount of fuel need be brought in, and the needs for a large cooling water supply might be obviated by the development of gas turbines.

"Nuclear power plants in contradistinction to hydroelectric power plants have the advantage of being able to supply process and heating steam directly in addition to power. Because nuclear plants lend themselves to decentralization, more economical industrial combinations should develop.

"Research has already shown possibilities for use of radio-

active isotopes in analytical work and medical treatment. These isotopes would be valuable by-products from the production of power, although they would probably have little effect on the economics of power generation.

"The nuclear power plant might aid in the industrial development of isolated parts of the world where the cost of oil, gas or coal is prohibitive and where a suitable water supply is unavailable, because the nuclear power plant, if combined with the modern gas turbine, would make unnecessary a supply of any such fuels or cooling water.

"The nuclear power plant, in connection with the modern gas turbine, might be desirable as operating or standby plants to existing large utilities.

"On the basis of this study, and other similar studies which have been made recently, it seems probable that nuclear power will

find favorable industrial application if obstacles are not placed in the path of its development.

"It is not altogether a case of nuclear power versus coal, oil or water power, because the nuclear power plant has advantages and fields of application not open to other types of power producing plants."

French Government Decrees 45-hr Week

Paris

• • • France's Minister of Labor has recently recommended the introduction of a 45-hr week, with 5 days of 9 hr each. He stated that the firms who would not agree to this recommendation would be barred from employing German prisoners of war, and if they asked for the importation of foreign workers their requests would be refused.

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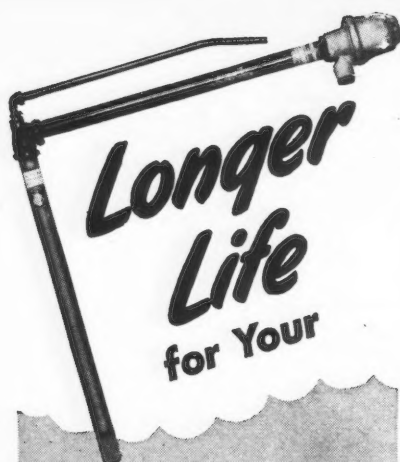
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NEWS OF INDUSTRY

Canadian Shipbuilders Receive French Order Totaling \$35 Million

Toronto

• • • Canadian shipbuilders have received orders from the French Government totaling \$35,732,825, for ships to be built over the next 2 yr, W. D. Low, managing director of the Canadian Commercial Corp., announced. The order is divided between six Quebec, Ontario and British Columbia shipyards, and involves 13 cargo vessels and 140 barges. The greater part of the order is to be completed before the close of St. Lawrence navigation next year, and five of the cargo ships are for delivery in 1948.

Mr. Low stated that the largest order goes to Canadian Vickers Ltd., Montreal, which will build four single-screw, motor-driven cargo vessels of 5500 long tons deadweight next year at a cost of \$2,350,000 each.

Davie Shipbuilding & Repairing Co., Ltd., Lauzon, Que., has received a contract for three, single-screw, motor-driven cargo vessels of 5500 tons deadweight, less main engine, engine spares and three diesel generators with spares. The contract price is \$1,725,000 each and all are to be completed by the end of 1947.

Marine Industries Ltd., Sorel, Que., received an order for eight motor cargo ships of 2600 metric tons deadweight at a cost of \$1,393,000 of which three must be delivered before the close of navigation in 1947 and the remaining five in 1948.

Canadian Shipbuilding & Engineering Co., Collingwood, Ont., received an order for 15 self-propelled hopper barges at a total contract price of \$6,360,000, all to be delivered before close of navigation in 1947.

Dominion Bridge Co., Ltd., Montreal, received an order for 20 self-propelled Rhine barges at total cost of \$3,228,000 all to be completed by June 1947, and also received a second contract for 80 barges each of 150 tons.

Victoria Machinery Depot Co., Ltd., Victoria, B. C., received an order for 25 self-propelled Rhine barges totaling \$2,587,125, all to be delivered by September 1947.

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